

Demonstration Of Agricultural Technology And Economics Projects



Province of British Columbia
Ministry of Agriculture and Food

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1985

D.A.T.E. PROGRAM REPORT

Demonstration of Agricultural Technology and Economics

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TERMS OF REFERENCE

D.A.T.E. funds may be used for:

1. Evaluating and demonstrating known technological advances for enhancing the production, processing and marketing of agricultural products.
2. Supporting adaptive research projects aimed at solving priority problems confronting British Columbia agriculture.
3. Investigating production, processing and marketing systems to identify or substantiate the need for new technology.
4. Supporting mission-oriented trips with the objectives of:
investigating innovative production, processing and marketing techniques for import or ultimate adaption in this Province; and/or
investigating export opportunities for British Columbia agriculture and food technology.
5. Importing expertise to assist in introducing new technology or to advise on critical problem situations.

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1985 D.A.T.E. PROGRAM

The D.A.T.E. (Demonstration of Agricultural Technology and Economics) Program provides funding for B.C. Ministry of Agriculture and Food staff supervised projects.

Forty-nine ongoing or new projects were reported on in 1985. Included below are highlights from a few of the areas studied.

- Several projects were devoted to studying forage from the point of view of utilizing new varieties, rotational programs, quality related to harvest time, and the use of high energy forages to reduce reliance on imported barley.
- A study of the effectiveness of high-tensile, high voltage, electric deer fences was carried out in the Okanagan Valley. Orchardists and ranchers will be able to minimize their losses to deer as a result of applying the results of this research.
- Pasture renovation, the development of organic wetlands, and rangeland tillage seeding and management were three projects carried out to demonstrate how agricultural capability can be increased. Costs and procedures used will be of real value to the agricultural community.
- A demonstration planting of Kiwifruit was established on southern Vancouver Island in 1985. The plantings performance exceeded all expectations and optimism is expressed regarding the successful introduction of Kiwifruit into coastal British Columbia on a commercial basis.
- An ongoing project is being carried out to address the suitability of the Duncan area to grape production. The 1983 planting is starting to bear fruit and evaluations are being carried out for both the fresh market and wine varieties.
- Several projects were devoted to the ongoing battle against pests that, in a variety of ways, attack food producing plants and create economic hardship for the farmer. Projects addressed pest problems in carrot, cucumber, onion, and potato crops.
- Vegetable crop diseases were the focus of projects dealing with carrots, onions, parsnips, and cole crops. Losses to disease in these crops will be decreased as a result of D.A.T.E. project research.
- Micro-computers are having a marked impact on the management decisions of farmers and ranchers. Micro-computer projects relating to apple plantings and to the improvement of the beef industry gave producers hands-on experience.

The D.A.T.E. Program Committee would like to acknowledge the co-operation of the project supervisors in the implementation of the 1985 D.A.T.E. Program. It also would like to express its appreciation to David Freed for compiling the report and to Eleanora Brown for typing the final copy.

DEMONSTRATION OF EQUIPMENT FOR DEVELOPING ORGANIC WETLANDS



R. Kilpatrick measuring the productivity of a front end loader ditching attachment.

Project Number: 93

Supervision: Roly Kilpatrick, Agricultural Engineer, Abbotsford;
Peter Fofonoff, District Agriculturist, Duncan

Co-operators: Eric Reay, Farmer; Martin Driehuyzen, Soils and Water
Management Specialist, Cloverdale; Dr. A.L. van Ryswyk,
Soils Specialist, Agriculture Canada, Kamloops.

Branches: Engineering, Regional Extension Services,
Thompson-Cariboo Region

Funding:	D.A.T.E. 1981-82	\$9,800
	D.A.T.E. 1982-83	\$4,800
	D.A.T.E. 1983-84	\$5,500
	D.A.T.E. 1984-85	\$8,350
	D.A.T.E. 1985-86	\$7,350

D.A.T.E. PROGRAM REPORT 1985

Objectives: To develop and demonstrate the special equipment and methods required to optimize forage production on organic wetlands in the interior. All major activities including land clearing, water level control, cultivation and seeding and harvesting are being filmed for use at extension events.

Summary: Organic wetland meadows are shallow lake basins that have filled in with partly decomposed plant material. In many areas these meadows are the rancher's primary source of winter hay. In their native condition, hay production on the meadows is severely limited by frequent flooding, and poorly producing sedge and grass species.

The production on native meadows can be more than tripled by reseeded with Reed Canary grass and fertilizing, however, due to the very low soil load bearing capacity, high water tables and other characteristics, specialized equipment and water management schemes are required.

This project has used a 20-acre portion of Eric Reay's meadow, at Meldrum Creek (west of Williams Lake) to develop and demonstrate techniques of:

- . brush clearing
- . perimeter ditching
- . lateral ditching
- . main watercourse improvement
- . drainage outlet improvement
- . water control structure design and installation
- . beaver dam control
- . plowing in heavy willow roots
- . secondary tillage
- . seeding and fertilizing
- . ditch maintenance main watercourse maintenance
- . field equipment flotation
- . water level management

Development methods and costs have been presented to ranchers at field days. As a result, many have begun improving their own meadows.

Plowing costs amounted to fully 25% of the total development cost. Efforts to reduce this cost through the development of a plow designed specifically for wetland conditions, are continuing.

FORAGE IMPROVEMENT PROGRAM FOR VANCOUVER ISLAND

- Project Number: 94
- Supervision: Peter Jones, District Agriculturist, Courtenay
- Co-operators: Vancouver Island Sheep Breeders Association
Field Angus Club
- Branches: Regional Extension Services, South Coastal Region
Field Crops Branch
- Funding: D.A.T.E. 1984-85 \$800
D.A.T.E. 1985-86 \$800
- Objectives:
1. Evaluate new forage species for Vancouver Island
 2. Compare pasture improvement methods using existing forage species.
- Summary:
1. Only two forage cuts were possible due to the long and severe summer drought. While drought and leather-jacket damage was severe in some species, a full evaluation of species tolerance will not be possible until sometime in 1986.
 2. As per 1984, the stage of growth is more important than the species or variety of grasses in the determination of nutritive value.
 3. There were large differences between species in their ability to tolerate drought stress. The shallow rooted rye grasses were the first to suffer. Tall Fescue was the only species to maintain a semblance of growth throughout the drought; it also recovered the fastest when rain did fall.

EVALUATION OF LOW COST OUTDOOR DOMICILES TO OVERWINTER QUEEN BEES



D. McCutcheon examining a small nucleus hive unit used for queen honey bee overwintering investigations

Project Number: 97

Supervision: Doug McCutcheon, Supervisor of Apiculture Program,
Abbotsford

Co-operators: B.C. Honeybee Stock Improvement Project; Simon Fraser
University

Branches: Field and Special Crops, Apiculture Program

Funding: D.A.T.E. 1982-83 \$4,124
D.A.T.E. 1983-84 \$3,300
D.A.T.E. 1984-85 \$3,100

Objectives: To develop practical methods of overwintering large
numbers of honeybee queens and to demonstrate such
methods in supplying commercial queen honeybee require-
ments in April and May.

Summary:

Of the four queen overwintering methods evaluated earlier, one was selected for more extensive testing in 1984/85. In this method, queens are placed on 4 x 4 cm sections of honey comb, surrounded by wooden sides and covered by queen excluder material. Certain modifications were developed according to new information gained. However, further tests of the system proved unsuccessful.

The additional test in which bees and queens were installed in small domiciles, constructed of styrofoam (approximately 20 x 20 x 20 cm) proved unsuccessful also.

Considerable further investigations are required to develop a foolproof practical economic method of overwintering queen honeybees for volume commercial use.

EVALUATION OF HIGH-TENSILE, HIGH-VOLTAGE, ELECTRIC DEER FENCES



Mule deer prevented from entering study enclosure
by 2.1 m 10-strand electric fence

Project Number: 100

Supervision: H.A. Kluge, Pest Management Specialist, Victoria

Co-operators: G.C. Anderson, Head Pest Control Technician, Kelowna
C.G. Carter, Control Technician, Vernon
K.B. van Dalfsen, Agricultural Engineer, Vernon
R. Hesketh, rancher, Cherryville
J. Ganzeveld, Summerland Sportmen's Association
R.C. Lincoln, Head, Wildlife Section, BCME, Penticton

Branches: Crop Protection, Engineering

Funding: D.A.T.E. 1984-85 \$5050
D.A.T.E. 1985-86 \$ 500

- Objectives:
1. To observe and record the behavioural responses of white-tailed deer and mule deer to different designs and configurations of high-tensile electric fences.
 2. To determine which design and configuration provides the most effective barrier for mule deer and white-tailed deer.

Summary:

Study sites were chosen in typical winter range for each of the two species of deer found in the Okanagan Region. The white-tailed deer site was on the Hesketh ranch, north of Cherryville. The mule deer site was on the east slope of Antlers Saddle between Summerland and Peachland. Each site consisted of a 30 m x 30 m enclosure with a covered feeder in the center.

Perimeter fence posts as well as a 2.4 m high page-wire fence on one side were installed prior to feeding. After the first major snowfall, deer were attracted to the sites by supplying alfalfa pellets, hay and/or apple pomace and allowing free access to the feed.

Following one to two weeks of habituation, a 1.5 m high 5-strand vertical fence, a 2.1 m high 7-strand vertical fence and a 1.2 m high 7-strand slanted fence were installed on the remaining three sides of each enclosure. High-tensile smooth wire as well as high-voltage energizers were used at both study sites. Observations of deer behaviour were made from stands in nearby trees between late afternoon and dusk for several weeks.

White-tailed deer initially entered the Cherryville enclosure by jumping through the two vertical fences. After wire spacings between 25 cm and 145 cm above ground were decreased from 30 cm to 15 cm, these deer jumped through the slanted fence. However, they did not penetrate the slanted fence after wire spacings were decreased from 30 cm to 15 cm.

Mule deer entered the Antlers Saddle enclosure by jumping over the slanted fence. After this was raised into an upright position, mule deer jumped through all three vertical fences. However, they did not enter the enclosure after wire spacings between 25 cm and 115 cm above ground were decreased from 30 cm to 15 cm.

A 1.2 m high 13-strand slanted fence, with all wires at 15 cm intervals, appeared to be the most effective design to exclude white-tailed deer. A 1.5 m high 8-strand vertical fence as well as a 2.1 m high 10-strand vertical fence, with the first wire 25 cm above ground, the next six wires at 15 cm spacings and the top one or three wires at 30 cm, appeared to be effective designs to exclude mule deer.

AUDIO-VISUAL RESOURCE LIBRARY DEMONSTRATION PROJECT



Audio-Visual Resource Library

Project Number: 103

Supervision: Ron Sera

Co-operators: David V. Kent

Branches: Information Services

Funding: D.A.T.E. 1985-86 \$4,000

Objectives: To dramatically expand farmer and staff awareness of agricultural production and processing technology from outside B.C., and from B.C. sources, using audio-visual communications equipment;

- a) purchase or duplicate 40-60 presentations per year as part of a comprehensive audio-visual library for staff use in extension programs to farmers;
- b) customize, wherever appropriate, non-B.C. audio-visual programs to B.C. agricultural conditions.

Summary:

This project is a continuation of work carried out during 1981-1984, which saw placement of video playback units in 10 field offices, and the purchase of video editing facilities in the ministry's media centre at Kelowna. The main emphasis during this year was expansion of the main a/v library in Kelowna, and building up the smaller libraries in selected field offices.

A total of 79 programs were added to the library; 7 produced by the Media Centre, 28 existing programs modified for the library, and 54 programs purchased or acquired. An additional 31 programs have been ordered for inclusion in the library before April 1, 1986. Thirty-eight percent of the programs relate to beef topics, 14% to other live-stock, 15% to crop production, 21% to apiculture, and 12% on other topics.

Over 135 programs were copied and distributed to field offices for their own mini-libraries.

Seventeen video units are currently available in the following ministry offices: Fort St. John, Dawson Creek, Smithers (transferred to Duncan as of November 12), Prince George, Williams Lake, Kamloops, Salmon Arm, Vernon, Kelowna (3), Summerland, Creston, Abbotsford, Cloverdale, and Victoria (2).

Records of use from the various field offices showed that ministry staff are the prime users of the equipment and video-tapes; farmers did not use the machines extensively while visiting ministry offices. Ministry extension staff set up the equipment at extension events, such as farmer meetings and local agricultural exhibitions where an estimated 3500 casual viewers used or watched a/v programs from the expanded library. Video units and tapes were also regularly used by extension staff for a/v support at courses, seminars and workshops. Video-tapes were loaned out extensively to farmers, and other institutions such as the Western Indian Agricultural Association, other government ministries, and community colleges throughout British Columbia.

In general, the use of audio-visuals in extension work is expanding as a means of transferring technology to farmers. More farmers are purchasing their own video machines which is expected to place more demand on the ministry's audio-visual library.

DEMONSTRATION OF NEW APPLE VARIETIES FOR COASTAL CONDITIONS



Variety Planting at Saanich Research Station

Project Number: 108

Supervision: B. Warner, Horticulturist, Sidney

Co-operators: Plant Quarantine & Research Station, Agriculture Canada,
Sidney; Bob Cropper, Orchardist, Courtenay;
John De Whalley, Farmer, Sointula, Malcolm Island

Branches: Regional Extension Services, South Coastal,
Crop Protection Branch

Funding: D.A.T.E. 1982-83 \$ 600
D.A.T.E. 1983-84 \$ 250
D.A.T.E. 1984-85 \$2,550
D.A.T.E. 1985-86 \$1,300

Objectives: To evaluate through field trials the suitability of new varieties of apples for growing under coastal conditions. Newer varieties, some with disease resistance are to be observed to see how they compare with current commercial varieties for both disease resistance and commercial acceptance.

Summary:

The plantings at all three locations have continued to perform very well, however, both the northern plantings had little or no fruit this year due to a late frost in May which killed most of the blooms.

Fruit set at Saanichton was very good and most trees carried very good crops. One of the early varieties shows a lot of promise and one local grower intends on planting some trees next year. One more year of evaluation should allow for some concrete recommendations regarding some of these varieties and allow for removal of some of the less promising ones.

Due to the extremely heavy workloads with two other commodities, grapes and kiwi fruit, no open houses were held. However, some individual growers did come to see specific varieties throughout the course of the harvest.

Once again, crows were a major problem and a trap was borrowed from the Crop Protection Branch. In future, such a trap will also be used but the bait will be changed to animal by-products to attract the crows away from the trees. Reports on the years' harvest will be presented at the 1986 Grower's Course on Vancouver Island.

ESTABLISHMENT AND MANAGEMENT OF RANGELAND SEEDING



Seeded vs. Native Species on Skookumchuk Prairie

Project Number: 113

Supervision: R.M. Tegart, Field Crops and Range Specialist, Creston;
M.J. Malmberg, District Agriculturist, Cranbrook

Co-operators: W.O. Green, Skookum Ranches, Skookumchuck; L.G. Brown,
Engineering Technician, Kamloops; N.A. Gough, Soil
Fertility Specialist, Kelowna; Bert van Dalfsen,
Engineer, Vernon

Branches: Kootenay Regional Extension Services

Funding: D.A.T.E. 1982-83 \$1,018
D.A.T.E. 1983-84 \$6,260
D.A.T.E. 1984-85 \$3,150
D.A.T.E. 1985-86 \$2,500

Objectives:

1. To demonstrate the tillage and seeding requirements necessary to ensure a successful seeding, through use of the Ministry's Rangeland Seeder.
2. To demonstrate the management of a Crested Wheatgrass/Alfalfa seeding by measuring animal performance and seeding productivity and assessing it through an economic evaluation.
3. To provide additional information on species and/or variety selection, fertility needs and the economics of fertilization.

Summary:

The seeding of Crested Wheatgrass (c.v. Parkway) and Alfalfa (c.v. Rambler) is performing very well. The summer drought provided for an excellent visual comparison. The seeding (dominantly Crested Wheatgrass) produced more forage, grew somewhat earlier in the spring and responded with significant growth (while the adjacent native species did not) to the early fall precipitation.

Work on the site this year included fertilization (60 kg/ha of nitrogen), and the construction of a 2.8 kilometer permanent electric fence. The building of the fence and the success of the seeding spawned numerous tours and on-site discussions.

EVALUATION OF A COMPUTERIZED APPLE SCAB PREDICTOR

Project Number: 118

Supervision: R.D. Hallman, District Horticulturist, Creston

Co-operators: John Yorston, Plant Pathologist, B.C.M.A.F.; John Procter, Entomologist, B.C.M.A.F.; Rick Williams, Climatologist, B.C.M.E.; Roy and George Schuler, Orchardists, Creston; B.C. Fruit Growers' Association.

Branches: Regional Extension Services, Okanagan-Kootenay Region

Funding: D.A.T.E. 1983-84 \$3,600
D.A.T.E. 1984-85 \$1,750
D.A.T.E. 1985-86 \$ 100

- Objectives:
1. To evaluate the new computerized "Apple Scab Predictor" for use in orchards, and compare it to conventional equipment for Apple Scab infection prediction.
 2. To improve the accuracy and dependability of Apple Scab disease infection warnings being issued by the B.C. Ministry of Agriculture and Food.
 3. To evaluate this equipment as an orchard management tool for:
 - a) timing Codling Moth sprays;
 - b) timing control sprays for other insects and diseases;
 - c) predicting stages of development of fruit trees for the timing of cultural practices.

Summary: Apple Scab is the most significant tree fruit disease in high rainfall areas of British Columbia. During the last few years it has become established in drier areas such as the South Okanagan. The weather conditions that lead to an infection by this disease are a combination of surface wetness, relative humidity over 90% and temperature. By monitoring these conditions, and determining infections as they occur, apple growers can effectively control this disease by timely applications of fungicides.

The "Apple Scab Predictor" is a in-orchard microcomputer based electronic monitoring system. It automatically records weather information and determines if an Apple Scab infection has occurred. The Predictor has other capabilities including the accumulation of degree days for a wide range of base temperatures.

1. The "Apple Scab Predictor" has functioned well for the prediction of Apple Scab infections. It is more accurate and often more dependable than conventional mechanical equipment.
2. B.C. Ministry of Agriculture and Food Personnel responsible for issuing Apple Scab infection warnings should have access to this type of equipment. In case of equipment failures it should be run in tandem with mechanical equipment.
3. a) During 1984 and 1985, the degree day function was tested for use in predicting Codling Moth development. Plugging the data produced by the Predictor into a degree day model for Codling Moth produced surprisingly accurate predictions of the correct times to apply control sprays.
 b) At this time, not enough is known about other insects and diseases common in this area to support the use of this instrument to assist in their management.
 c) As with (b) above, not enough is known about the response of tree fruits to weather, to allow the use of this instrument as a cultural management tool.

GRAPE VARIETY EVALUATION ON VANCOUVER ISLAND



John Vielvoye and Brent Warner harvesting the first crop of Sovereign Ruby, a muscat flavored wine grape.

Project Number: 125

Supervision: John Vielvoye, Provincial Grape Specialist, Kelowna

Co-operators: Brent Warner, Horticulturist, Sidney; Peter Fofonoff, Agriculturist, Duncan; Crop Protection Branch, Victoria; Denis Zanatta, Landowner, Duncan; Ministry of Environment, Climatology.

Branches: Regional Extension Services - Okanagan Kootenay
- South Coastal

Funding: D.A.T.E. 1984-85 \$3,500
D.A.T.E. 1985-86 \$2,000
D.A.T.E. 1986-87 \$2,000

Objectives: To determine the suitability of the Duncan area of Vancouver Island to grape production.

Summary:

A test planting of 35 grape varieties was planted in 1983. A drop irrigation system, electric deer fencing and netting to protect the crop from bird damage have been installed. Cultural operations are performed by Ministry staff.

All varieties survived the 1984/85 winter. Winter damage to vigorous growth of Pearl of Csaba, N.Y. 21572, Gutedel Weiss, and Schonburger kept these varieties from producing a crop of sufficient size for wine making. The variety Sovereign Gold, although not damaged by the winter, did not produce enough fruit to make wine. Chardonnay produced little fruit because the plants are 1 year younger than the rest of the planting.

Fresh market varieties (Festivee, Interlaken, Reliance, Suffolk Red, Sovereign Coronation, Sovereign Charter) are being evaluated with co-operation from Canada Safeway and Cowichan Valley produce. Wine varieties are stemmed and crushed at the site. The must is transported to Agriculture Canada, Summerland, where wine is made for evaluation.

YIELD AND CHEMICAL ANALYSIS OF THE 1985 CROP

Variety	Harvest Date	Average Yield per vine(lbs.)	Chemical Analysis		
			Sugar(%)	pH	Total Acid
Aurora	Oct. 4	3.8	20.8	3.2	1.2
Auxerois	Oct. 4	5.98	19.2	3.1	0.9
* Castel 19637	Oct. 12	2.95	25.0	3.1	1.1
Cayuga White	Oct. 20	24.66	18.6	3.0	1.1
Chardonnay	Oct. 20	--	19.0	3.2	1.1
Ehrenfelser	Oct. 12	5.09	19.0	3.0	1.3
Festivee	Oct. 12	2.5	18.4	3.1	1.3
* Gamey Noir	Oct. 12	0.42	21.8	3.0	1.1
Gutedel Weiss	Oct. 4	4.27	17.0	3.0	1.0
Interlaken	Sept. 28	2.4	19.2	3.0	0.6
Kerner	Oct. 18	10.8	20.	3.1	1.5
Madeleine Angevine	Oct. 4	10.79	19.4	3.0	1.1
Madeleine Sylvaner	Sept. 6	14.27	16.8	3.4	0.7
Muller Thurgau	Oct. 4	3.4	17.6	3.0	1.0
New York Muscat	Oct. 4	4.66	20.0	3.1	0.7
New York 21572	--	--	--	--	--
Okanagan Riesling	Oct. 20	9.6	20.2	2.9	1.3

* Damaged by birds

D.A.T.E. PROGRAM REPORT 1985

YIELD AND CHEMICAL ANALYSIS OF THE 1985 CROP (cont'd.)...

Variety	Harvest Date	Average Yield per vine(lbs.)	Chemical Analysis		
			Sugar(%)	pH	Total Acid
Ortega	Sept. 14	4.95	18.6	3.0	1.0
Pearl of Csaba	Sept. 6	--	17.2	3.3	0.8
Pecore de Malinge	Sept. 6	3.7	17.4	3.1	1.0
Rayon D'or	Oct. 20	14.54	20.0	3.0	1.5
Reliance	Oct. 19	4.96	21.0	3.0	0.9
Schonburger	Oct. 4	1.5	21.0	3.2	0.8
Siegerrebe	Sept. 6	4.72	16.4	3.3	0.7
Seyval Blanc	Oct. 20	23.9	20.0	3.0	1.3
Sovereign	Sept. 27	3.99	19.3	2.9	0.6
Coronation					
Sovereign Charter	Oct. 19	14.0	17.0	3.1	0.7
" Gold	Oct. 4	1.7	22.6	3.2	0.9
" Jubilee	Oct. 4	2.9	19.0	3.1	0.6
" Ruby	Oct. 4	5.3	18.6	3.1	1.0
" Tiara	Oct. 18	3.4	21.0	3.4	0.8
Suffolk Red	Oct. 19	2.34	19.0	2.9	1.1
Venus	Oct. 12	5.66	20.0	3.1	1.3
Vidal 256	Oct. 20	13.5	18.8	3.0	1.8
Weissburgunder	Oct. 20	3.5	21.8	3.2	1.1

AGRONOMIC FACTORS AFFECTING FORAGE QUALITY AND ANIMAL UTILIZATION

Project Number: 133

Supervision: Al McNeil, Livestock Specialist, Prince George

Co-operators: Mike and Ann Migvar, Punchaw Region, Prince George
Dr. Malcolm Tait, University of British Columbia
Dr. Lyle Rode, Agriculture Canada, Prince George
Jim Tingle, Field and Special Crops Branch, Prince George

Branches: Livestock

Funding: D.A.T.E. 1984-85 \$9,700
D.A.T.E. 1985-86 Nil

Objectives: 1. To evaluate the progressive differences in forage quality between two clover mixes that occur over the growing season;
2. To evaluate differences in forage quality between species and varieties currently grown in central British Columbia.

Summary: Forage quality is a major constraint to livestock production in the central interior of British Columbia. Improvement in forage quality can significantly increase returns to producers through decreased feed costs and increased livestock performance.

A feed intake and digestibility trial was conducted to determine how two different forage mixes (alsike clover-timothy and red clover-timothy) cut at three different stages (10% and 100% bloom) are used by animals. The harvest dates and the nutrient composition of the hay mixes are given in Table 1. Each cutting was subjected to actual field conditions.

A second part of the study involves measuring forage quality differences between species and varieties of grasses and legumes. These results are available from the supervisor.

The results in Table 1 show that protein levels remained constant during the harvest period but that energy (digestible nutrient) levels dropped with the last cut in August.

Table 1

Cutting Dates, Nutrient Composition, and Intake and Digestibility of Hay Mixes.

(Dry Matter Basis)

Hay Mix	Cutting Date	Crude Protein (%)	Total Digestible Nutrients (%)	Dry Matter Intake (g/BW.75)	Dry Matter Digestibility (%)	DOM2 Intake (g/BW.75)
Alsike Clover-timothy -bromegrass mix						
10% bloom (July 9)		11.5	55	80	64.5	48
50% bloom (July 15)		11.5	59	80	67	49
100% bloom (July 22)		11.4	56	81	63	47.5
Red Clover-timothy mix						
10% bloom (July 22)		12.7	55	73	63	42
50% bloom (July 30)		11.9	54	77	62	44
100% bloom (Aug. 8)		11.9	51	68	59	37

1 Percentage bloom of the legume component of the mix

2 DOM = Digestible Organic Matter

Fistulated sheep were used to measure feed intake and digestibility differences between the two mixes. Statistical analysis of the results indicate that the alsike clover mix has higher intake and digestibility than the red clover mix. The increased intake and digestibility suggest that these two factors may be as important as yield when deciding what species to include in a forage mixture. In this study the alsike clover mix is used 10 percent more efficiently than the red clover mix (as shown by DOM intake). The alsike clover maintained its quality level to 100% bloom while the red clover mixture declined in quality at 100% bloom.

RASPBERRY PLANT QUALITY SURVEY



Project leaders comparing variable cane growth on greenhouse grown raspberry plants - a reflection of the variable quality of the planting stock being used by growers

Project Number: 134

Supervision: W.S. Peters, Provincial Berry Specialist, Abbotsford

Project Contractor: Michael McCann, Vancouver

Co-operators: Drs. T.R. Vrain, H.S. Pepin, R.R. Martin, and H.A. Daubeny of Agriculture Canada's Vancouver Research Station and Dr. R.J. Copeman of U.B.C.

Branches: South Coastal Regional Extension Services

Funding: D.A.T.E. 1984-85 \$ 3,800
D.A.T.E. 1985-86 \$10,400
D.A.T.E. 1986-87 \$ 7,200

Objectives: To document the quality of the raspberry planting stock being used by B.C. growers and to demonstrate the superiority of using pathogen-free stock.

Summary:

The use of good quality, pathogen-free planting stock is not widely practiced by B.C. raspberry growers which leads to reduced grower income from lower yields and shorter lived plantings. Thus planting stock (Certified and non-certified from B.C., Oregon and Washington State) was randomly sampled and assessed for the major known factors affecting plant survival, growth and subsequent yields.

Prior to planting out for field survival evaluation, the plants were rated for size and visible disorders. Sub-samples were established in a greenhouse and subjected to laboratory analysis for nematodes, virus and root rots.

Increased plant mortality and reduced shoot growth were correlated with small cane diameter stock and late planting while poor root grade also reduced shoot growth. Overall, mortality and shoot growth in the plots was similar to grower experiences in 1985.

No virus diseases or crown gall were detected. All Certified stock was free of Phytophthora root rot, but 16% of the non-certified plants were infected by this new and devastating disease. Only 24% of the samples had no detectable nematodes in either the initial testing or after ten weeks cultivation in a greenhouse. In the initial sampling, 12% of the certified plants contained detectable nematodes while after 10 weeks 53% were found to be infested. Plants from the B.C. Certification program tended to have fewer nematodes than the plants from Washington State. The non-certified plants were 89% infested and some samples contained extremely high populations.

This project is a two year study, and in the following year the field plots as well as the commercial fields will be monitored so that survival, growth and yield can be correlated to all the factors measured on the planting stock.

CONTROL OF CARROT BLACK ROOT ROT IN THE SOUTH COASTAL REGION



Inoculating carrots with
Chalara elegans spores - Cloverdale

Project Number: 135

Supervision: D.J. Ormrod, Plant Pathologist, Cloverdale

Co-operators: L.S. MacDonald, Project Employee; W.J. Odermatt,
Vegetable Specialist, B.C.M.A.F.; P.W. Perrin,
Research Scientist, Agriculture Canada; B.C. Coast
Vegetable Co-operative Association; G. Sprangers,
carrot grower.

Branches: Crop Protection; Regional Extension, South Coastal Region

Funding: D.A.T.E. 1984-85 \$4,000
D.A.T.E. 1985-86 \$4,000
B.C. Coast Veg. Co-op 1984-85 - \$4,776
1985-86 - \$5,000

Objectives: To determine the factors involved in the development of black root rot in fresh market carrots and to provide information on preventive measures which can be used by the industry.

Summary: Two years of study has provided the information necessary to avoid black root rot outbreaks in the future, provided that growers and packers co-operate in adhering to certain guidelines. Following is a summary of the main points.

1. *Chalara elegans* (Black Root Rot) is too widespread in the South Coastal Region and has too many hosts for avoidance or crop rotation to be an effective control measure.
2. The cultivars Sprinter, Top Pak, Six Pak, and Six Pak II show some resistance.
3. The causal fungus will grow on carrots at temperatures of 7°C and higher.
4. Light is not required for growth of the fungus.
5. Chlorination is effective in preventing infection only if applied within 48 hours of the carrots being inoculated with spores. Inoculation occurs at and after harvest.
6. The optimum level of chlorine in the wash or hydro cooling water to prevent spread and growth of overwintering spores is in the range of 40 - 80 ppm.
7. Hydro cooling carrots promptly after harvest will significantly reduce infection provided the core temperature of the largest carrots is reduced to 7°C or lower.

BIOLOGICAL CONTROL OF ROOT AND STEM ROTS OF GREENHOUSE CUCUMBERS
GROWN IN ARTIFICIAL MEDIA

Project Number: 136

Supervisors: Brian Mauza, Provincial Greenhouse Specialist, Abbotsford;
Dave Ormrod, Plant Pathologist, Cloverdale

Co-operators: Jim Rahe, Simon Fraser University; Robert Favrin,
Contract Researcher

Branches: Field & Special Crops/Crop Protection

Funding: D.A.T.E. 1984-85 \$8,000
D.A.T.E. 1985-86 \$7,500

Objectives: To sample various growing media to determine the reasons
for different levels of soil-borne disease problems.
To inoculate growing media with known antagonists in an
attempt to achieve non-chemical control of cucumber root
and stem rot.

Summary: In December and January fifty-two (52) potting media
samples were collected from growers and analyzed for pH,
mix type and Pythium species present. Twenty-one of the
samples were positive for Pythium species. Four species
were isolated, D. aphanidermatum, P. irregulare, P.
coloratum and Pythium sp. Group G and each proved to be
pathogenic on long English cucumbers. All but Pythium
Group G caused death of young plants, but Group G infected
plants were restricted in their growth.

In the fall of 1985, Trichoderma harzianum a known anta-
gonist will be tested as a means of limiting the develop-
ment of Pythium species in greenhouse grown cucumbers.

As present control measures for this disease of long
English cucumbers are inadequate, the necessity of ex-
ploring alternate control methods becomes more important.
Biological control methods are desirable as they can be
integrated more easily with existing pest control methods.

FABABEANS FOR HIGH PROTEIN SILAGE PRODUCTION ON VANCOUVER ISLAND

Project Number: 143

Supervision: Michael Betts, Regional Field Crop Specialist, Sidney

Co-operators: George Aylard, Farmer, Sidney; Agriculture Canada
Research and Plant Quarantine Station, Sidney

Branches: Regional Extension Services, South Coastal Region

Funding: D.A.T.E. 1984-85 \$1,500
D.A.T.E. 1985-86 \$1,500

Objectives: To evaluate the potential of fababeans for production
of high protein silage. This high protein silage
would be used as a home grown supplement for low protein
corn silage.

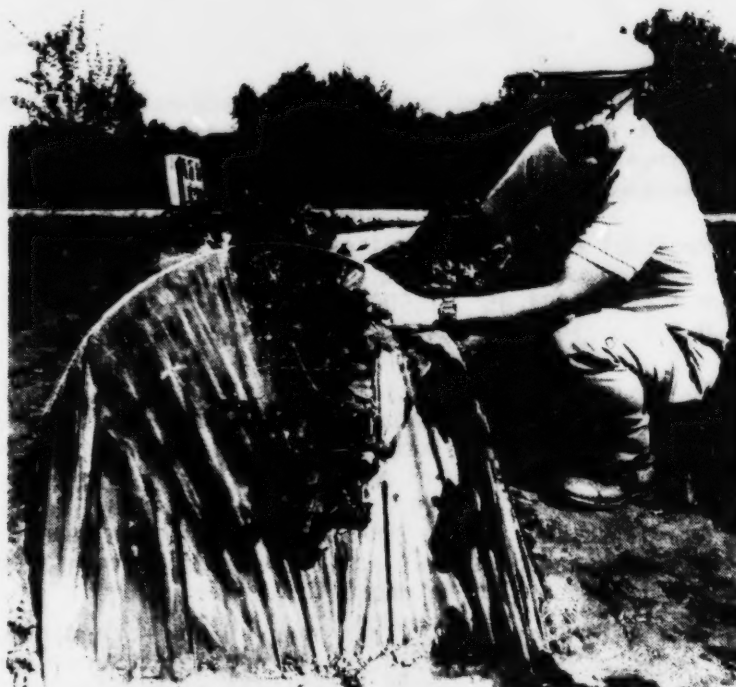
Summary: As summerized in the 1984 D.A.T.E. Program Report,
reasonable success was achieved in producing fababeans
for silage at Errington, B.C.

In the fall of 1984, fababeans variety Ackerperle were
seeded at six weekly intervals beginning September 12th
and ending October 26th. Evaluations made in the spring
of 1985 confirm that fall seeded fababeans must be
planted early as the best plant stand was obtained from
the September 12th seeding date. Samples of the winter
varieties Banner and Bourbon have been obtained, but
were received too late for fall 1985 planting due to
Ascochyta fabae blight test requirements. These varieties
will be planted in the fall of 1986.

Fababeans, variety Aladin, were planted May 18, 1985 on
two acres. Establishment was poor due to very dry soil
conditions, high daytime temperatures and seedling damage
due to flocks of pigeons. Final plant stand was less
than one third of the population required for a good crop.
Weed control on this site, with the use of Treflan/Sencor
tank-mix, was good considering the lack of crop competition.

In the spring and fall of 1986, new stands of spring and
fall fababeans will be established for final evaluation
of this crop.

DEMONSTRATION AND EVALUATION OF VEGETABLE SEEDING AND PLANTING PRACTICES



Plasticulture can be used to protect warm season crops from light frosts, stimulate early growth and increase vegetable production.

Project Number: 144

Supervision: G.S. Emmond, Regional Horticulturist, Prince George

Co-operators: John Curtis, Vegetable grower, Taylor
R. Tutte, Vegetable grower, Prince George
Hildo Hoek, Vegetable grower, Smithers
John Bahr, Vegetable grower, Terrace

Branches: Regional Extension Services

Funding: D.A.T.E. 1984-85 \$2,410
D.A.T.E. 1985-86 \$2,220

Objectives: To evaluate early maturity and yield of vegetables:
(1) directly fall seeded, fluid spring seeded and normal spring seeded, (2) grown under hot tents, floating mulch, slitted plastic tunnels and on bare ground, and (3) grown on black plastic, clear plastic and on bare ground.

Summary: Late Fall seeding - At Prince George, only 10 to 27% of the seeds of broccoli, carrots, head lettuce and parsnips germinated and grew to normal maturity. Although spinach and summer turnips had double the seedling emergence, they severely bolted as did the cos lettuce and the beets. Soil crusting and very dry spring conditions were two problems that affected seedling emergence and growth.

Plasticulture - Several plasticulture treatments were demonstrated in the Central and Peace River regions on grower fields. Black plastic (B.P.) mulch laid over the soil prevented weed growth and any visible stress to the crop plants from moisture deficiency. Hot tents and B.P. mulch covered by plastic tunnels, spun bonded polyester (Reemay) tunnels or floating mulches were very effective in protecting cucumbers, tomatoes and zucchini plants from light frosts or cold winds. Minimum temperature measurements indicate that the solid plastic (Kerilea) and the slitted plastic tunnels had similar night time temperatures while the Reemay floating mulch was 2 to 3 degrees warmer. The Reemay and the slitted plastic tunnels are self ventilating and did not cause any foliage scorching. The Kerilea tunnels had to be partially open on sunny days.

Plants grown under Reemay floating mulches and tunnels, followed by these grown under slitted plastic tunnels, had the first fruits ready for harvesting. At Taylor in the Peace River, the Reemay covered plots produced the highest number of slicing cucumbers. At Prince George, the Reemay and slitted plastic plots produced the same number of zucchini while at Smithers considerably more zucchini were produced on the slitted plastic plots than on the Reemay plots.

EVALUATING COMMUNITY PASTURE RENOVATION SYSTEMS



Seeding pasture after land preparation

Project Number: 146

Supervision: Erich Schulz, Engineering Branch, Victoria

Co-operators: Garth Elgie, District Agriculturist, Prince George;
Jim Tingle, Field Crops Specialist, Prince George;
Rob Kline, Soils Specialist, Prince George;
W/M Community Pasture, Prince George; Agriculture
Canada Research Station, Prince George

Funding: D.A.T.E. 1984-85 \$ 3,450
D.A.T.E. 1985-86 \$22,950

Objectives: To determine the most appropriate methods of renovating
pastures that have become sod-bound after numerous
years of use.

Summary:

A 75 acre parcel of land at the W/M Community Pasture that had not been renovated for 15 years and was sod-bound was divided into 12 equally-sized plots. Eleven treatment methods were used to renovate the pasture with the remaining plot being used as the check plot. A number of the initial treatments were done in the fall of 1984 with the remaining work being done in the spring and summer of 1985. All plots, except the check plot, received the same amount of seed and fertilizer. Due to the extreme drought during the summer of 1985, no seed had germinated by late fall.

The 75 acre parcel has been fenced and germination and production data will be collected in the coming year.

The treatment methods and their associated costs have been summarized in the following table. It should be noted that seed costs at \$18.05 per acre and fertilizer costs at \$28.18 per acre have not been included in the tables; however, the associated application costs have been added.

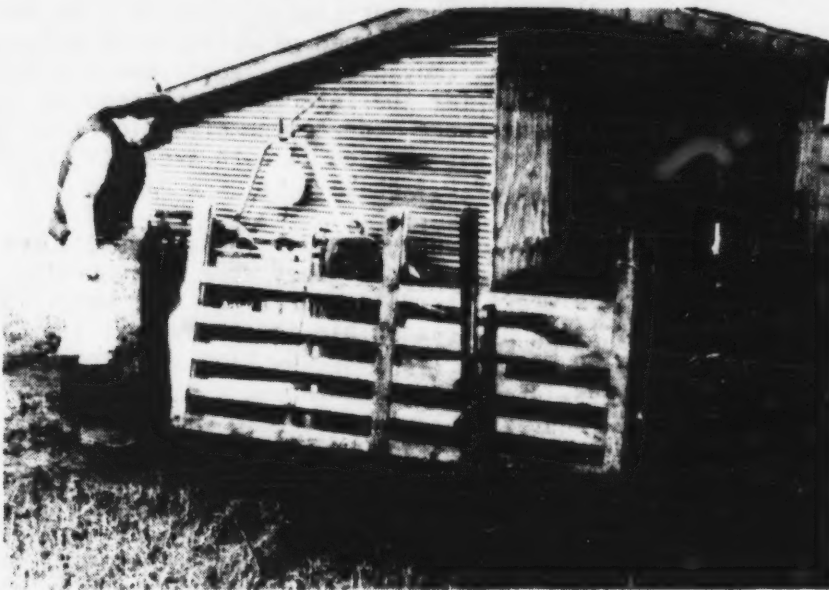
PLOT NO.	TREATMENT METHODS	TOTAL COST/ACRE
I	Fall plow and disc Spring disc and seed	\$ 62.67
II	Herbicide treatment plus BCMAF Range Seeding Equipment	131.25
III	Fall plow Spring rotovate and seed	76.90
IV	Fall two-pass breaking disc Spring double disc and seed	64.31
V	Spring plow and disc Summer disc and seed	76.71
VI	Spring two-pass breaking disc Summer disc and seed with BCMAF Range Seeding Equipment	88.04
VII	Spring rotovate, plow, disc and seed	100.95
VIII	Herbicide treatment plus seed with Melroe zero-till drill	84.04
IX	Fall plow Spring disc and seed	53.80
X	Herbicide treatment plus seed with Pioneer hoe drill	90.63

chart continued - next page

PLOT NO.	TREATMENT METHODS	TOTAL COST/ACRE
XI	Check plot and Fertilizer trials	\$ 0.00
XII	Fall double aerate (all) Spring double aerate and seed (1/2) Spring single aerate and seed (1/2)	31.06 (24.00)

The above treatment method costs will be correlated to production data when this data has been collected to determine the optimum pasture renovation method.

INTENSIVE ROTATIONAL GRAZING IN THE PEACE RIVER REGION



Weighing Sheep

Project Number: 147

Supervision: R. Green, Forage Agrologist, Dawson Creek

Co-operators: Northern Lights College, Dawson Creek, B.C.

Branches: Regional Extension Services, Central/Peace River

Funding: D.A.T.E. 1984-85 \$3,300
D.A.T.E. 1985-86 \$ 500

Objectives: To evaluate the productivity of intensive rotational grazing as compared to continuous grazing in terms of sheep (lamb) performance, pasture production and economics.

Summary:

The project was continued for this, the final year, using lambs instead of ewes. The three-hectare Alfalfa (10%)-Brome (90%) hayfield was fenced, then cross-fenced into two 1½-hectare blocks using 6-wire, high tensile electric fence in May 1984. Water and shelter was provided in both pasture units, with the rotationally grazed area designed for division into 8 pie-shaped paddocks; each accessing a water-shelter area. Movable steel posts and electric polywire were used for the interval cross-fencing (pies). Minor improvements were made to the electric fence for 1985. Fertilizer was applied to both areas (90 kg/ha of N and 30 kg/ha of P_2O_5) on May 1st.

Forty-eight lambs, averaging 27 kilograms were turned into each pasture June 5th. They were subsequently weighed at 2 week intervals. Grazing cages were placed in each rotational grazing pie and throughout the continuous area to monitor forage production. Photos were also taken at regular intervals.

Due to the unusually dry conditions during the spring and summer, the lambs only grazed until July 19th. During this time the rotationally grazed unit was moved at 2-day intervals during the first two weeks, 1½ day intervals during the next two weeks and daily for the final two week period. Due to the poor productivity of the rotational side a considerable number of animals were removed. Fifteen lambs were taken out June 28th and an additional 16 were removed on July 12th. No lambs were taken from the continuous side during the 54 day session.

The continuously grazed unit out performed the rotational side again this year in dramatic fashion, providing 2592 lamb-days of grazing as compared to 2048 lamb-days for the rotational side. Total gain on the continuous side was 309 kg/ha, considerably more than the 188 kg/ha for the rotationally grazed lambs. Individual gain on the continuous side was 9.7 kg/head (.18 kg/day) as compared to 6.9 kg/head (.12 kg/day) for the rotational unit.

The much touted superiority of rotational grazing was not realized over the two years of this project. The superior performance by the "continuous" ewes during 1984 was surprising, but it was felt the superior nutrient content of the rotationally grazed area would likely not benefit ewes. However, growing lambs also performed much better on the continuous side in 1985.

The reported increased production of rotational grazing is almost always made in comparison to "what was done previously". This usually was continuous grazing at low stocking rates with little or no inputs. However, when similar management is utilized with the two systems (side-by-side) continuous grazing appears to be at least as productive. Even if animal performance and pasture production were equal with both methods, the extra cost associated with the 30-40 hours of labor as well as additional equipment required for rotational grazing could hardly be justified.

The slow regrowth potential of Smooth Brome grass may be the reason for the relatively poor performance of rotational grazing. However, since most forage in the Peace River has Brome grass as a major component, the results are quite applicable. Weather shouldn't be a factor since 1984 and 1985 provided extremes in growing conditions, ideal and very poor respectively. Although the results of this project are by no means conclusive, we are very disappointed in the productivity of rotational grazing since our intention was to demonstrate its advantages (which seem quite logical) to producers in order that they might adapt this technique.

CHEMICAL CONTROL OF BRUSH REGROWTH ON FENCELINES



Project Number: 148

Supervision: J.R. Green, Forage Agrologist, Dawson Creek

Co-operators: J.L. Dobb, Dawson Creek Groundbirch Livestock Association

Branches: Regional Extension Services, Central/Peace River

Funding: D.A.T.E. 1984-85 \$1,500
D.A.T.E. 1985-86 \$ 200

Objectives: To evaluate several chemicals for control of brush regrowth on fencelines.

Summary: There are over 500 miles of fenceline in North and Central B.C., located in wet, native areas on which brush regrowth is a serious problem. Willow, poplar and alder regrowth in and around the fence create many problems including increased fence repair and maintenance, increased damage to wildlife, poor livestock distribution and increased round-up costs.

Most of these areas are only accessible by foot, horse or all-terrain vehicle. Results of this project would provide the basis for an all-terrain or horse-drawn applicator.

In addition to accessibility, other problems are encountered on fencelines. One must be able to apply herbicide to the shrubs and trees without damaging the grass. In addition, there may be some difficulty getting through the brush regrowth in order to spray or rub the herbicide onto the leaf areas. The wire and posts not only eliminate the possibility of mechanical control, but also create difficulty when using chemicals.

Eight herbicide treatments were applied to fenceline brush regrowth over 135 metres of fenceline within Groundbirch Community Pasture on August 2nd, 1985. Horizontal spraying (backpack sprayers) was utilized to simulate a single pass by an all-terrain or horse-drawn applicator. The brush regrowth included poplar, willow, alder, birch, rose and some spruce from $\frac{1}{2}$ - 3 metres in height.

A Special Use Permit was granted by the Pesticide Control Branch to facilitate the project.

The trial was randomized with three replicates of the eight herbicide treatments plus a control, each 5 metres long. The following herbicides and rates were utilized:

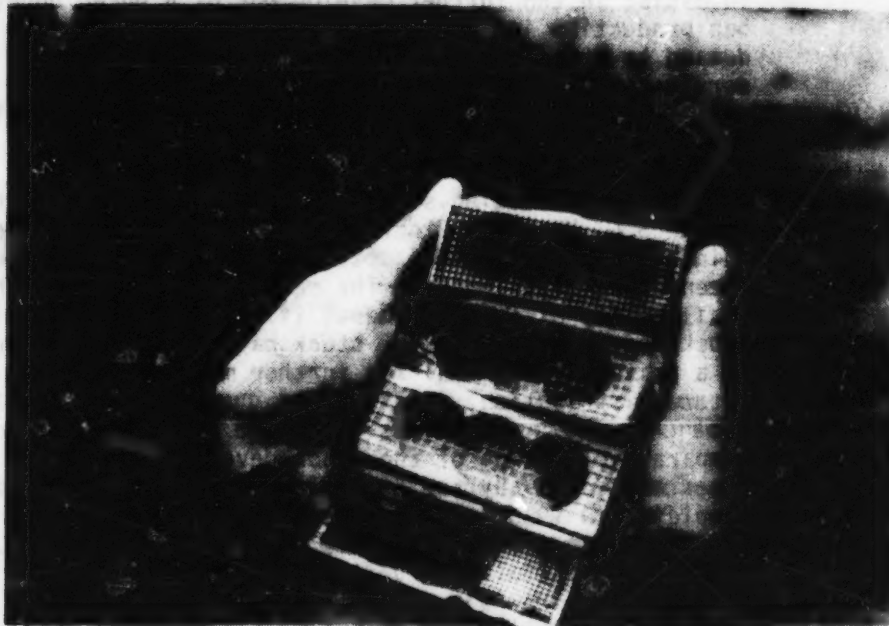
HERBICIDE	APPLICATION RATE (kg a.i./ha)
1. Roundup (glyphosate 360 g/L)	2 kg/ha
2. Tordon 22K (picloram)	1.5 kg/ha
3. Tordon 10K (picloram)	4 kg/ha
4. Spike 80W (tebuthiuron)	4 kg/ha
5. Spike 5%G (tebuthiuron)	11 kg/ha
6. 2-4-D Amine 500 gal/l plus Banvel LH 400 gal/l (dicamba)	2 plus 1.5 kg/ha
7. DPX-T6376 DF	.15 kg/ha
8. SC0224 (Stauffer)	3.4 kg/ha
9. Control	

Photos were taken of each replicate prior to application. The project was monitored at monthly intervals until freeze-up.

Results will not be conclusive until next spring's growth begins. However, preliminary observations thus far suggest the 2-4-D/Banvel treatment appears to be most effective in all three replicates followed by SC0224 and Tordon 22K in that order.

Monitoring of this trial will be continued by Regional Extension - Central/Peace River next year along with additional trials at different times during the summer and using varied application rates.

DEVELOPING A HONEYBEE QUEEN PRODUCTION INDUSTRY IN BRITISH COLUMBIA



Different queen shipping cages are demonstrated at a queen production course

Project Number: 152

Supervision: D. McCutcheon, Supervisor of Apiculture, Abbotsford

Co-operators: F. Calvert, Powell River Division, Powell River;
Capital Region Division, B.C. Honey Producers Association.

Branches: Field & Special Crops, Apiculture Program

Funding: D.A.T.E. 1984-85 \$16,050
D.A.T.E. 1985-86 \$13,500

Objectives:

1. To accelerate the adoption of honeybee stocks developed in British Columbia by continuing the improvement and distribution of these stocks to queen producers.
2. To assist in the further development of a queen honeybee production industry to meet a perceived market demand by providing training courses, consultative services and publications for producers by updating economic analyses and by encouraging establishment of producer organizations.

Summary:

1. The honeybee breeding stock developed at Powell River by the B.C. Honeybee Stock Improvement Project has been maintained over the 1985 active season. Fifteen breeder queens were distributed. The methods used ensures the availability of at least equal if not better breeder stock for the future. The stock has been turned over to a private individual for further maintenance and future distribution.

2. Comparative testing of the stock developed at Powell River and Vernon by the Stock Improvement Project was completed in 1985. Thirty queens each from Powell River, Vernon and a California breeder were compared. Results are as follows:

- * Vernon and California stocks wintered equally with similar spring populations and stores consumption over winter. Powell River stocks showed less stores consumption and had a considerably lower spring population.
- * In good honey flow conditions Vernon stock was superior in honey production to California stock. Powell River was inferior to California stock. Under poor or slow flow conditions Powell River stock produced better followed by Vernon and California.
- * In the gentleness test, Powell River was gentlest, followed by Vernon and California stock.
- * In provisioning brood chambers for winter, Vernon stock was judged best followed by Powell River and California stocks.

Two field short courses on queen production were provided in 1985 at Victoria and Fort St. John. A cost of production publication was completed and made available during the year.

PROPAGATION AND CONTAINER GROWING FACILITY
FOR NURSERY STOCK

Project Number: 153

Supervision: N. Senn, Provincial Nursery Crops Specialist, Cloverdale;
P. Leidenfrost, Abbotsford

Co-operators: Westgro Sales Inc., Richmond, B.C.

Branches: Field and Special Crops

Funding: D.A.T.E. 1984-85 \$5,800
D.A.T.E. 1985-86 \$1,500

Objectives: To provide facilities to carry out on-going propagation and container-growing studies of nursery stock.

Summary: Construction of the polyethelene-covered greenhouse was completed in late 1984. During 1985, a sawdust-covered container bed area, irrigated with an overhead sprinkler system was built immediately adjacent to the greenhouse. In addition, plots with trickle-drip irrigation for field-grown stock were established. The container bed and field areas will, with the greenhouse, provide facilities for on-going studies of nursery stock production.

Beginning in late 1984 with the completion of the greenhouse, several species of cuttings were rooted to provide a population of plant materials for use in experimental trials. Cuttings prepared to date include several varieties each of Rhododendron and Rosa minima, as well as Thuja, Prunus laurocerasus, Pieris, Viburnum and Forsythia. In addition to supplying needed materials for trial work, some of these cuttings were planted in the field for growing on to provide stock plants for future propagation needs. A wide variety of plant material will continue to be propagated each year for both trial work and to provide stock plants.

Using rooted cuttings, a trial was established in spring 1985 to compare two slow-release fertilizers. Two methods of application, incorporation and dibbling, were used with low, medium and high rates of fertilizer applied to three species of plants. With incorporation, fertilizer is mixed

uniformly throughout the potting media. This is the method most commonly used by growers. Dibbling is a new technique and not yet in wide-spread use, but may have merit for accelerated production of some plants. With dibbling, a concentrated layer of fertilizer is placed directly under an unrooted or newly-rooted cutting. While placement of fertilizer with the dibble method promotes rapid growth for many plants, serious losses can occur from salt burn. Therefore, both specific rates of application for the dibble method, and plant tolerance to this technique must be determined. Results of the 1985 trial have not yet been tabulated. This study will continue in 1986. Final recommendations will be added to the container mix recommendations in a future edition of the Nursery Production Guide.

DEMONSTRATION OF INTEGRATED PEST MANAGEMENT
FOR VANCOUVER ISLAND VEGETABLE CROPS

Object Number: 154

Supervision: Tony Kluge, Pest Management Specialist, Victoria

Contractor: Paul Heels

Co-operators: Bong Eng, Raymond Galey, Terry Lim, Jim and Jack Mar,
Vern and Wilmer Michell, vegetable growers, Victoria;
Bob Vernon, Agriculture Canada Research Station, Vancouver.

Branches: Crop Protection

Funding: D.A.T.E. 1985-85 \$9,950
D.A.T.E. 1985-86 \$9,500

Objectives:

1. To continue to demonstrate to commercial vegetable growers that, with integrated pest management (IPM), they can accurately time and significantly reduce the number of insecticidal sprays required to control carrot rust fly (*Psila rosae*) and onion maggot (*Delia antiqua*) without increasing crop damage.
2. To analyze the economics of this program for Vancouver Island and initiate the transfer of this technology to a permanent program, e.g. via a commercial monitoring service.

Summary: The monitoring systems used in this study were based on those designed for commercial carrot and onion growers on the Lower Mainland which have been operating successfully for several years. The majority of carrot (31.8 ha) and onion (18.3 ha) fields on the Saanich Peninsula were monitored this year for carrot rust fly and onion maggot respectively. Based on insect trap counts and an established economic threshold, growers were advised whether insecticide sprays were warranted.

Carrot rust fly populations were low in most of the 22 carrot fields monitored with distinct peaks of activity in May and August-September. Growers normally apply 3 to 6 sprays/field/season (avg. 4.8) for control of this pest. Under IPM, they applied 0 to 3 sprays (avg. 0.9); no sprays were required on approximately half of all fields. Reduction in pesticide use ranged from 19.5 to 98.3% among the five growers (avg. 89.0%). Few unrecommended sprays were applied compared to

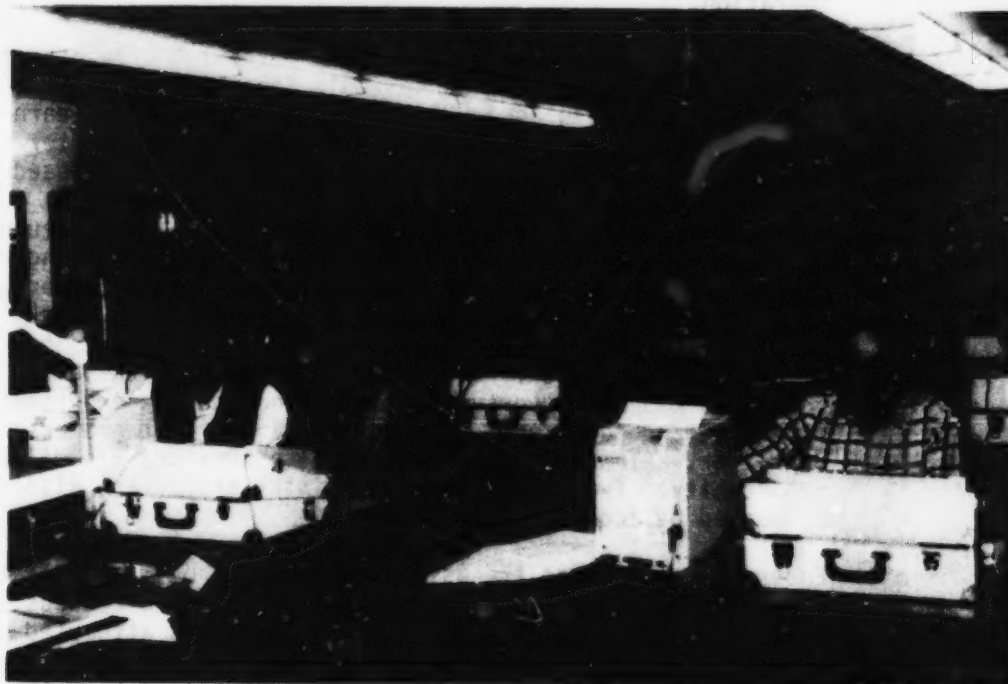
last season's program, reflecting increased grower confidence in the accuracy of monitoring to detect injurious pest levels. Reports from growers and crop sampling indicated little or no significant damage.

The number of sprays normally applied by the four co-operating onion growers varied from 2 to 6 / field / season (avg. 4.3). As only one onion maggot fly was caught this season, a 100% spray reduction was achieved. Damage due to onion maggot was not evident in any fields.

To determine whether this approach would be economically feasible for producers, a detailed report that attempted to calculate the net change in pest control costs resulting from a reduced spray routine under IPM was prepared for each grower. The methodology of an Agriculture Canada study on IPM for Lower Mainland growers was adapted to consider the machinery, labour and pesticide costs in addition to other factors related to crop production that IPM affects indirectly. The results show that three growers would significantly benefit by subscribing to the proposed monitoring service. Net savings in pest control costs ranged from \$23.77 to \$31.40/ha in carrots and \$38.35 to \$61.58/ha in onions. Although the economics were not as favorable for the other two growers, they still indicated a willingness to have monitoring continue because of the other benefits that IPM provides. These include reduced levels of pesticide residues on crops, reduced exposure of growers and their field workers to potentially hazardous pesticides, reduced risk of adverse effects on the environment and delaying the development of pesticide resistance.

Lower Mainland growers pay \$75.00/ha for monitoring services for carrots and onions. Given the smaller acreage on the Saanich Peninsula, the same full-scale monitoring program would require a fee well above this figure, probably making it cost-prohibitive for local growers. However, an analysis of the estimated time requirements and trap construction costs indicated that, if growers were willing to service the traps in their own fields, a fee of \$75.00/ha could provide adequate incentive for a company or individual to offer this service. The consultant would visit each grower once a week to make insect identification, exchange traps and give appropriate recommendations on timing and location of foliar sprays.

MICROCOMPUTERS FOR RANCH MANAGEMENT AND ANALYSIS



Preparing farm cashflow budgets using microcomputers

Project Number: 165

Supervision: G. Roger Keay, Regional Farm Economist, Kamloops;
Charles E. Brown, Farm Business Management Technician,
Kamloops

Branches: Economics

Funding: D.A.T.E. 1984-85 \$12,000
D.A.T.E. 1985-86 \$ 4,000

Objectives: To demonstrate the use of microcomputers in recording
and analysing ranch physical and financial information
with the purpose of improving beef industry management
practises.

Summary:

Microcomputers have the capability of storing, sorting, re-organizing and recalling information to provide reports useful to the management of the modern ranch or farm operation.

Two microcomputers and the Microsoft Multiplan spreadsheet program were purchased in June 1984. The Macintosh computer was chosen as the microcomputer easiest to learn and operate. The computers were used during last winter to demonstrate the ways the Multiplan program can be used. This program was used to develop cashflow projections, breakeven feeder prices, forage production cost and return reports, calculating beef feeder rations and determining the most profitable level of fertilization of silage corn. Using these computers, with others in the Ministry, workshops were held in Kamloops, Cranbrook, Vernon, Fort St. John and Dawson Creek. Over 75 beef farmers in these locations had the opportunity to obtain hands-on experience with the microcomputers. An additional 50 fruit growers in Oliver, Kelowna and Vernon were also provided a similar opportunity. Two workshops for Ministry staff were also conducted by Economics Branch staff.

Future plans include the use of Jazz or Microsoft Excell to demonstrate the maintenance and analysis of herd records. Maintaining financial records on Multiplan was attempted and found to be too complicated for the average farmer to use. The use of a General Ledger program called Back to Basics by Peachtree will be used. An agricultural accounting program developed by Red Wing in the U.S. is also being obtained to further explore the keeping of financial records on the microcomputer.

ECONOMICS OF ORCHARD PRODUCTION SYSTEMS



Economist discusses orchard replant alternative with growers.

Project Number: 168

Supervision: George Geldart, P.Ag., Regional Economist, Summerland

Project Staff: Howard Joynt, Farm Business Management Technician,
Summerland

Co-operators: Mike Sanders, P.Ag., Provincial Tree Fruit Specialist,
Kelowna; Tim Watson, P.Ag., Tree Fruit Commodity
Coordinator (Okanagan-Kootenay Region), Oliver;
Leo Touw, Commercial Grower, Kelowna; Ken and Margaret
Hayter, Commercial Growers, Kaleden; Ken Ziebart,
Commercial Grower, Oliver; Buck Barkwill, Commercial
Grower, Summerland

Branch: Economics

Funding: D.A.T.E. 1984-85 \$13,000 (actual)
D.A.T.E. 1985-86 \$ 1,000

Objectives: To develop a production cost model on a micro-computer to evaluate the profitability and financial implications of various intensive planting systems for apples.

Summary: As economic conditions change, the agricultural industry must adapt in order to maintain sound, viable farms. Over the past few years there has been an increasing interest in growing apples in high density systems. Such intense production yields a greater number of apples earlier in the life of an orchard, than do standard or lower density systems.

As an aid to determine which system is best from a financial and economic point of view, a model was developed in the fall of 1984 to analyse the costs and returns for various densities of apple planting systems. The Apple Macintosh micro-computer was selected because of its portability and relatively low costs, so that analyses could be conducted at workshops as well as on individual farms. When combined with other criteria, the computer model will enable an orchardist to make a decision on the most profitable planting density for replanting an existing orchard or establishing a new one. The model is flexible in that it can be adjusted to reflect a grower's individual situation. For example, changes in the quantity, quality, and prices of apples can be made in order to determine the effects on profit.

This cost model is directly coordinated with the Ministry's Regional Extension program, and will enhance the production recommendations of Horticulturists, by placing more emphasis on the financial and economic aspects of intensive apple production.

During the past year, several workshop and farm consultations have been conducted. The versatility of this computer model has allowed us to demonstrate the impacts of a number of production and financial variables on the profitability of apple planting systems. From these demonstrations has come extension material that will also be used in the decision making process. Another result of this mode has been an increased interest in the financial impacts of orchard intensification.

PEACE RIVER CEREAL AND OILSEED EVALUATION PROJECT



Cereal Evaluation Field Day

Project Number: 169

Supervision: Robert Kohlert, Regional Director, Central/Peace River

Co-operators: Agriculture Canada, Beaverlodge Research Station;
Bill Bickford, Farmer, Montney; Alberta Wheat Pool,
Dawson Creek

Branches: Regional Extension Services, Central/Peace River

Funding: D.A.T.E. 1984-85 \$5,000
D.A.T.E. 1985-86 \$5,500

Objectives: To evaluate and demonstrate the adaptability of new cereal
and oilseed varieties in the B.C. Peace River Region.

Summary:

Two one-hectare sites were selected in April. The South Peace site (Alberta Wheat Pool - 2 km east of Dawson Creek) was improved by ditching and leveling to prevent flooding that occurred in previous years. A different site was selected for the North Peace Project at Bill Bickford's farm, 12 km north of Fort St. John. Sufficient land was cultivated to allow continuation of this project on an adjacent site in 1986. Both plots were seeded and harvested by Beaverlodge Research Station staff. Regional Extension Services maintained the projects. The South Peace site was seeded May 15th and the North Site was planted on May 16th.

Fifty-nine different varieties were seeded including 30 Barley, 11 Hard Red Spring Wheat, 11 Oat and 7 Canola. A replicated (3), completely random-block design was utilized again this year. Each replicate consisted of four, 5 metre rows, 20 cm apart.

Most of the cereals and oilseeds are standard, licensed varieties. Many have only recently been developed and others are in the final stages of licensing.

Despite extremely dry conditions, both plots did relatively well. Harvesting occurred at the North Peace site August 20th, 29th and September 11th. The South Peace plot was harvested September 9th and 11th. Only 2 replicates were harvested at Dawson Creek because of the drought.

The relative yield information will again be used to form the basis for the 1986 Peace River Crop Variety Recommendations.

A tour of the Dawson Creek project was conducted July 11th, 1985.

CROPPING TOMATOES AND CUCUMBERS UNDER THERMAL CURTAINS



Thermal Curtain being drawn over a long English cucumber crop

Project Number: 173

Supervision: Brian Mauza, Provincial Greenhouse Specialist, Abbotsford

Co-operators: C. Dyble - Farm Representative, B.C. Hydro

Branches: Field & Special Crops

Funding: 1984-85 \$1,700
1985-86 \$ 250

Objectives: To determine the effect of a horizontal thermal screen on the earliness, fruit set, vegetative growth and disease problems of tomato and cucumber crops grown in sawdust culture during an early crop schedule.

Summary: A tomato crop was grown under a thermal curtain during the Spring of 1985. The material used was a white woven fabric known as LS55. The horizontal screen will be tested on a long English cucumber crop from October '85 to March '86.

Tomatoes and cucumber crops grown during the period October to March require high heat inputs. The thermal curtain reduced the heat demand in our test compartment by 35%. This appeared to be the greatest benefit of this type of system. No apparent increase in fruit weight, fruit set or disease problems were observed.

The structural components of the thermal curtain reduced the light by 3.4% when stacked back during the day. Under direct light conditions this shading effect might reduce plant growth.

In October 1985 the height of long English cucumber plants was significantly higher when grown under the horizontal curtain than with no curtain. This means fewer days before the plants reach the horizontal wire at 2 meters. Plants had 1 less leaf below the 2 meter level.

The crop's response to a horizontal thermal curtain will be completed by March 1986. This information will provide a useful reference for cropping tomatoes and cucumbers under thermal screens, especially during the period October to March.

THE EVALUATION AND DEMONSTRATION OF VARIOUS ASPECTS OF Highbush BLUEBERRY
PRODUCTION IN THE SOUTH COASTAL REGION



Excellent first year weed control by
preplant fumigation

Project Number: 175

Supervision: J.T. Hill, Horticulturist, Abbotsford

Co-operators: J.S. Gaskin, Blueberry Propagator, Richmond, B.C.
Carey Brono, Nematologist, B.C.M.A.F., Cloverdale

Branches: Regional Extension Services; Crop Protection Branch

Funding: D.A.T.E. 1984-85 \$4,500
D.A.T.E. 1985-86 \$2,700

Objectives:

1. Evaluate and demonstrate the characteristics of a number of highbush blueberry cultivars.
2. Evaluate the effects of nematodes on new plantings.
3. Demonstrate the economic benefits of netting as a method of bird control.
4. Demonstrate trickle irrigation
5. Establish safe and effective foliar application rates for minor elements.

Summary:

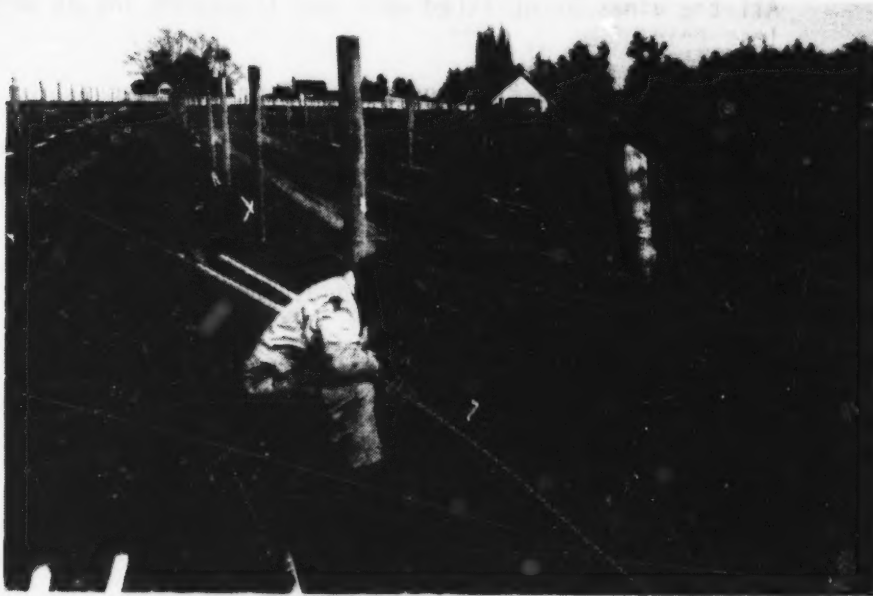
A variety trial was established using 10 plants each of 9 new varieties. Eleven standard varieties were also planted to use as a comparison. No useful data could be collected as the plants are too young. Early yield data will be collected in 1986.

A plot of 120 plants was established. Half of the plot received a preplant treatment of Vapam for nematode control. Early indications are that plants grew better in the treated soil. As a side benefit, excellent first year weed control was achieved in the treated soil.

One half of a small plot of 4 year old Bluecrop plants was covered with netting. The other half of the plot was left unprotected. A good measure of bird control was achieved in the protected plot.

Effective and safe rates for foliar applications of copper, iron, zinc and boron were established. This new information is included in the 1986 Berry Production Guide.

DEMONSTRATION KIWIFRUIT PLANTINGS IN SOUTH COASTAL B.C.



Kiwifruit plants being planted at the Vantreight Planting
on Vancouver Island in April, 1985

Project Number: 181

Supervision: B. Warner, Horticulturist, Sidney; Erich Schulz,
Engineering Branch, Victoria

Co-operators: Agriculture Canada (New Crop Development Fund); Ian
Vantreight, George Doney, Harm Wernicke (co-operating
farmers); Julia Verishine, Project employee

Branches: Regional Extension Services, South Coastal, Engineering
Branch

Funding: D.A.T.E. 1984-85 \$21,300

Objectives: To demonstrate the potential of kiwifruit as a horticultural
crop for South Coastal British Columbia.

Summary: The three, one acre jointly sponsored plantings (Agriculture
Canada's New Crop Development Fund, B.C.M.A.F. D.A.T.E.
program) were planted during April, 1985 with two year old

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dormant grafted kiwifruit vines from California. The project runs for five years by which time the vines should be into full production.

All the vines established well and transport losses were less than .5%.

Growth during the first growing season exceeded all expectations and provided the winter of 1985-86 is normal, some fruit should be harvested next year. The success of the planting to date has been due greatly to the efforts of Erich Schulz, (B.C.M.A.F. Engineering Branch), Ted Taylor, (Butler Bros. Fencing) and Rich Greig (C.P.I. Irrigation), as well as the growers themselves, who have done a tremendous job of handling a crop completely new to them.

CONTROL OF GREENHOUSE THRIPS WITH A
FLOOR SPRAY OF A GLUE-INSECTICIDE SOLUTION



Application of a glue-insecticide solution
to plastic floor covering

Project Number: 182

Supervision: R. Costello, Entomologist, Cloverdale

Co-operators: T. Kavalaars, C. Duyvestan, J. Duyvestan;
commercial greenhouse cucumber growers.

Branches: Crop Protection Branch

Funding: D.A.T.E. 1984-85 \$1,000
D.A.T.E. 1985-86 \$ 600

Objectives: To evaluate an England-developed control technique using a product known as Thripstick for the control of thrips in greenhouse cucumbers.

Summary: Prior to the start of the greenhouse cucumber season, a sprayable, water soluble glue known as Thripstick was imported from England, where it has been successfully used to control thrips.

At the first appearance of thrips, the insecticide Decis was added to the glue (plus water) and this solution was applied, through a power sprayer, to the plastic floor covering below the cucumbers. The spray solution consisted of one part Decis 2.5 EC, 100 parts Thripstick and 100 parts water. 200 litres of this solution were used to treat 0.4 hectares (1 acre) of greenhouse area.

During one stage of their life cycle, thrips drop from the plants to the soil. It is this stage that the glue-insecticide solution is directed against.

This control method was evaluated in three commercial cucumber greenhouses, and the results were similar in each of them. Thrips numbers remained constant for six to eight weeks after treatment, and then began to increase. The co-operating growers felt their control method was useful as it delayed a build-up in thrips and the damage this pest does to the crop.

A number of growers intend to use a glue-insecticide floor spray for thrips control during the next growing season. A Vancouver horticultural supply company has made arrangements to import and sell Thripstick.

EVALUATION OF HIGH ENERGY FORAGES FOR INTENSIFYING
LIVESTOCK PRODUCTION IN THE OKANAGAN-KOOTENAY REGION



Field Day at Steeples Ranch, Cranbrook

Project Number: 183

Supervision: M. Soder, District Agriculturist, Oliver

Cooperators: Thomas Ranches Ltd., Okanagan Falls; Steeples Ranch,
Cranbrook; G. Tegart, Field Crops Specialist, RES, Creston;
M. Malmberg, District Agriculturist, RES, Cranbrook;
M. Quigley, Technician, RES, Vernon; Soil, Feed and Tissue
Testing Laboratory, BCMAF, Kelowna

Branches: Regional Extension Service, Okanagan-Kootenay;
Soils Branch

Funding: D.A.T.E. 1984-85 \$16,099
D.A.T.E. 1985-86 \$11,500 (estimated)

Objectives: To evaluate the adaptability of high energy forage crops in
the Okanagan-Kootenay region as a means of reducing reliance
on imported barley and getting more value per acre from
forage producing land.

Summary:

Cattle feeding in the region is still heavily dependent on barley as an energy source in growing and finishing rations. Since most of the barley is trucked in from southern Alberta, transportation costs are a significant constraint in attaining a competitive position with Alberta finished beef.

The predominant forages, alfalfa and various grass-legume mixtures, are generally inadequate for the energy levels required in feeding rations. Forage corn is a satisfactory alternative, but requires specialized equipment for harvesting, a deterrent to smaller operations, and is not as widely adaptable as some other crops. High energy forage options such as cereals harvested for silage grown with a late maturing grass for fall grazing, or double cropping other cereals with forage rape or kale, offer the opportunity to reduce the dependence on barley, improve opportunities for feeding beef economically in the region, and improved land utilization.

In the first year, field scale plots were established in Okanagan Falls and Cranbrook. Eleven different crops or combinations were established and evaluated for yield, energy levels, and protein. Other important factors such as weed control; critical seeding dates; and additional input costs were also monitored. A number of crop combinations showed promise. Some solid recommendations should be possible at the end of this three year project.

Field days were held at both sites to publicize the project within the ranching community. More publicity is planned as results become available.

CONTROL OF PEAR TRELLIS RUST IN RICHMOND, B.C.



Juniper removal in Richmond (after)
showing replacement stock donated by Richmond nurseries

Project Number: 184

Supervision: D.J. Ormrod, Plant Pathologist, Cloverdale

Co-operators: D.A. Jans and P. Tubajon, Project Employees;
Agriculture Canada, Plant Health Division; B.C. Nursery
Trades Association; Massot Nurseries; Lang's Nurseries;
Jone's Nurseries; Art Knapp's Plantland; Municipality
of Richmond

Branches: Crop Protection

Funding: D.A.T.E. 1985-86 \$8,000
Agriculture Canada 1985-86 \$8,000
B.C.N.T.A. and Co-operating Nurseries 1985-86 \$2,000

Objectives: To determine if it is possible to reduce the incidence
of pear trellis rust in Richmond to a negligible level
at which pear to juniper spread does not occur through
a relatively modest two year, two employee cleanup program.

Summary:

During May and June, 1985, junipers in areas where rust was known to occur, were inspected and a total of 138 were removed. These were replaced with other types of ornamentals donated by the co-operating nurseries. During July, pear trees at 450 addresses on the computerized inventory were inspected and infections were recorded and removed. In August, previously unsurveyed areas were inspected and pear trees were located at another 450 addresses. Again, infections were recorded and removed. Altogether, during the pear inspection, approximately 60,000 infections were counted and removed.

As a result of this work, a detailed list of properties with nearby juniper infections is ready for year 2 of the project, commencing in the spring of 1986.

B.C. MINISTRY OF AGRICULTURE AND FOOD (B.C.M.A.F.)
D.A.T.E. PROGRAM REPORT 1985

CROP RESPONSE TO PHOSPHORUS AND POTASSIUM IN CENTRAL B.C. AND THE CARIBOO

Project Number: 185

Supervision: J. Tingle, Forage Specialist and R. Kline, Soil Specialist,
Prince George

Co-operators: B. Farr and J. Collins, Consultants

Branches: Regional Extension Services, Central/Peace River Region;
Soils Branch; Field and Special Crops Branch

Funding: D.A.T.E. 1984-85 \$4,425
D.A.T.E. 1985-86 \$2,655

- Objectives:**
1. To design P_2O_5 (Phosphorus) and K_2O (Potassium) fertilizer recommendation tables for use at the BCMAF Kelowna Soils Lab based on actual alfalfa, grass-legume and barley crop response.
 2. To draft a technical bulletin summarizing soil, crop/ yield and forage quality interactions with NPK fertilizer applications.

Summary: The Feed Freight Adjustment Fund and the BCMAF have funded the Central and Cariboo area Fertilizer by Crop Correlation Study. Various rates of P_2O_5 and K_2O were applied to irrigated alfalfa, grass-legume hay or barley silage crops on low, medium and high P_2O_5 and K_2O soil test level fields. Soil nutrient determination was conducted at the Kelowna lab using the Bray P-1 method for phosphorus and the normal ammonium acetate method for potassium. The Mitscherlich-Bray method was used to develop new recommendation tables for each crop on a relative yield basis.

A sample of the suggested tables for each crop is outlined below:

**Phosphorus Fertilizer Recommendation Table
Using the Mitscherlich Bray Function**

Crop and Fertilizer Phosphorus Required to Obtain 95% of Maximum Yield			
Soil Test P p.p.m.	Irrigated Alfalfa Kg/ha $P_{2}O_5$	Dryland	
		Grass-legume Kg/ha $P_{2}O_5$	Barley Silage Kg/ha $P_{2}O_5$
5	60	69	71
10	44	56	64
15	27	43	58
20	11	31	51
30	0	5	38
40		0	25
50			11
60			0

**Potassium Fertilizer Recommendation Table
Using the Mitscherlich Bray Function**

Crop and Fertilizer Potassium Required to Obtain 95% of Maximum Yield			
Soil Test K p.p.m.	Irrigated Alfalfa Kg/ha K20	Dryland	
		Grass-legume Kg/ha K20	Barley Silage Kg/ha K20
25	92	73	73
50	69	51	56
75	46	28	39
100	23	6	22
125	0	0	5
150			0

These new tables represent accurate fertilizer recommendations based on regional fertilizer response. The tables place a ceiling on recommended rates and eliminate the need for starter fertilizer applications. While there is little change in recommended phosphorus levels, maximum potassium rates have been sharply reduced.

TRIAL PLANTING OF FEIJOA AT SAANICHTON RESEARCH STATION

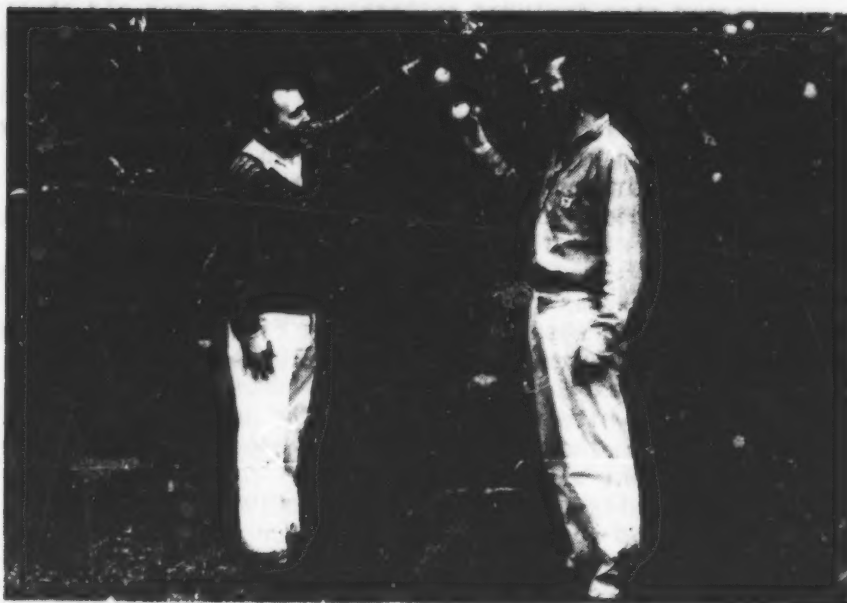


Initial Feijoa plants established at Saanichton, June 1985

- Project Number: 186
- Supervision: Brent Warner, Horticulturist, Sidney
- Co-operators: Agriculture Canada at Quarantine and Research Station, Sidney
- Branches: Regional Extension Services, South Coastal
- Funding: D.A.T.E. 1984-85 \$1,150
- Objectives: To establish an experimental planting of Feijoa at the Saanichton Research Station to determine the suitability of South Coastal British Columbia to producing this crop.
- Summary: The initial planting of 20 two year old plants was made in June 1985. These were locally purchased. In July 1985, 100 grafted 1 year old named varieties arrived from New Zealand and were potted. These will be planted in the field in the spring of 1986.

The initial plants have established and should be providing fruit in a couple of years, at which time fruit quality and consumer acceptance will be studied. A plastic wind-break was installed to protect the plants from the winter winds, which can be very damaging since these plants are broadleaf evergreens.

APPLE POWDERY MILDEW MONITORING SYSTEM



Examining fruit at harvest for powdery mildew russet damage.

Project Number: 187

Supervision: J.M. Yorston, Plant Pathologist, Summerland

Co-operators: Fred Peters, Ecoyoos Consulting Service, Osoyoos;
Dr. Bill McPhee, Okanagan-Similkameen Co-op fieldman,
Oliver; Okanagan-Similkameen Co-operative

Branches: Crop Protection Branch

Funding: D.A.T.E. 1984-85 \$1,300
D.A.T.E. 1985-86 \$7,800

Objectives: To test the effectiveness of a monitoring system for
predicting the timing and number of sprays to control
powdery mildew on apple.

Summary:

The project was started in March, 1985 with the assessment of 101 apple blocks in 33 commercial orchards in the South Okanagan and Similkameen. The first step was to calculate the percentage of white tipped shoots in each block. The second step included collecting of one year old shoots which were forced in the greenhouse, and examined under a microscope for mildew.

With this information, orchards were divided into low, medium and high risk categories and then appropriate spray recommendations given to the growers. It was recommended that some low risk blocks receive no sprays and high risk blocks, two pre-bloom sprays.

Each block was re-evaluated in June with more sprays recommended when necessary. The final harvest evaluation was made by examining fruit for russet.

Counting white tips in the dormant season gave a quick, reliable method of determining the potential for disease development within a given block. Spray programs based on the white tip count gave effective disease control. Mildew did not appear to be a major cause of russet in some badly russeted blocks of Golden Delicious.

Another conclusion of the study is that some growers apply too many sprays for the control of powdery mildew. This monitoring technique will help convince growers to cut back on their spraying and to time their sprays more accurately but still get good control of powdery mildew.

EARLY DETECTION OF GREENHOUSE CUCUMBER PESTS, WITH EMPHASIS ON THRIPS

Project Number: 198

Supervision: Bob Costello, Entomologist, Cloverdale;
Brian Mauza, Greenhouse Specialist, Abbotsford

Co-operators: B.C. Greenhouse Vegetable Growers Research Committee
Mr. Don Quiring, contract researcher

Branches: Crop Protection Branch; Field & Special Crops Branch

Funding: D.A.T.E. 1984-85 \$2,250
D.A.T.E. 1985-86 \$6,750
B.C. Greenhouse Vegetable Growers Research Committee
1984-85 \$2,250
1985-86 \$6,750

Objectives: To develop a monitoring program for pests of greenhouse cucumbers so that growers can initiate control measures as early as possible and thereby reduce crop damage and minimize pesticide use.

Summary: The western flower thrip causes severe damage to leaves and fruit of hothouse cucumbers. It is particularly difficult to control as it is resistant to many registered chemicals. Detecting infestations early allows control measures to be implemented when the pest populations are low and when these measures are more effective. As well, the method employed allows for early detection and monitoring of other pests such as whiteflies and fungus gnats.

A 5 x 60 cm. strip of yellow polyethylene covered in a sticky material (Sticky Stuff-Olsen®) served as the trap. All growers were supplied with traps - 1 trap per 50 plants. On regular intervals traps were monitored for presence of pests and 20 - 25% of the traps were used for population estimates. This information was given directly to the grower to allow him to respond accordingly.

This trap technique proved to be an accurate early warning system. In all greenhouses, where thrips and whiteflies were not evident on the crop at the time the traps were

Summary:

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Brian Mauza, Greenhouse Specialist, Abbotsford

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Mr. Don Quiring, contract researcher

Branches: Crop Protection Branch; Field & Special Crops Branch

Funding: D.A.T.E. 1984-85 \$2,250
D.A.T.E. 1985-86 \$6,750
B.C. Greenhouse Vegetable Growers Research Committee
1984-85 \$2,250
1985-86 \$6,750

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Summary: The western flower thrip causes severe damage to leaves and fruit of hothouse cucumbers. It is particularly difficult to control as it is resistant to many registered chemicals. Detecting infestations early allows control measures to be implemented when the pest populations are low and when these measures are more effective. As well, the method employed allows for early detection and monitoring of other pests such as whiteflies and fungus gnats.

A 5 x 60 cm. strip of yellow polyethylene covered in a sticky material (Sticky Stuff-Olsen®) served as the trap. All growers were supplied with traps - 1 trap per 50 plants. On regular intervals traps were monitored for presence of pests and 20 - 25% of the traps were used for population estimates. This information was given directly to the grower to allow him to respond accordingly.

This trap technique proved to be an accurate early warning system. In all greenhouses, where thrips and whiteflies were not evident on the crop at the time the traps were

introduced, pests were detected on the traps before the grower had any indication they were present.

Recommendations have been developed as to trap density, trap dimensions, time of introduction of traps and location of traps in the crop. This early detection technique has become a recommended practice and is incorporated into the 1986 production guide. The project also identified an opportunity for a private entrepreneur to provide an early detection and monitoring service to greenhouse growers.

AGRO-CHINA '84

Project Number: 189

Supervision: Brian Hodge, Director, Export Market Development

Co-operators: The Honourable Harvey Schroeder, Minister of Agriculture and Food; Dr. Gordon MacEachern, Deputy Minister; Mr. Brian Hodge, Director of Agricultural Export Market Development; Mr. George Aylard, President of ARDCORP Ltd.; Mr. Peter Friesen, President, Fraser Valley Milk Producers Assn.; Mr. Fred Marshall, Vice-President, B.C. Tree Fruits Ltd./Sun Rype Products Ltd.; Mr. Peter Hill, Director, B.C. Hog Marketing Commission; Mr. Fred Fiestmann, Vice-President, IMW Industries Ltd.; Mr. Karl Liu, International Division of the Canadian Imperial Bank of Commerce

Branches: Export Market Development

Funding: D.A.T.E. 1984-85 \$20,000
D.A.T.E. 1985-86 \$ 3,000

Objectives: The mission was organized as a follow-up to the visit of the Honourable W.R. Bennett, May 1984, and in response to an invitation extended by the Provincial Government of Guangdong Province in the People's Republic of China. The B.C. Minister of Agriculture and Food was invited to address Agro China '84, a major agricultural exposition (trade show) and symposium for officials and agribusinessmen from all parts of China.

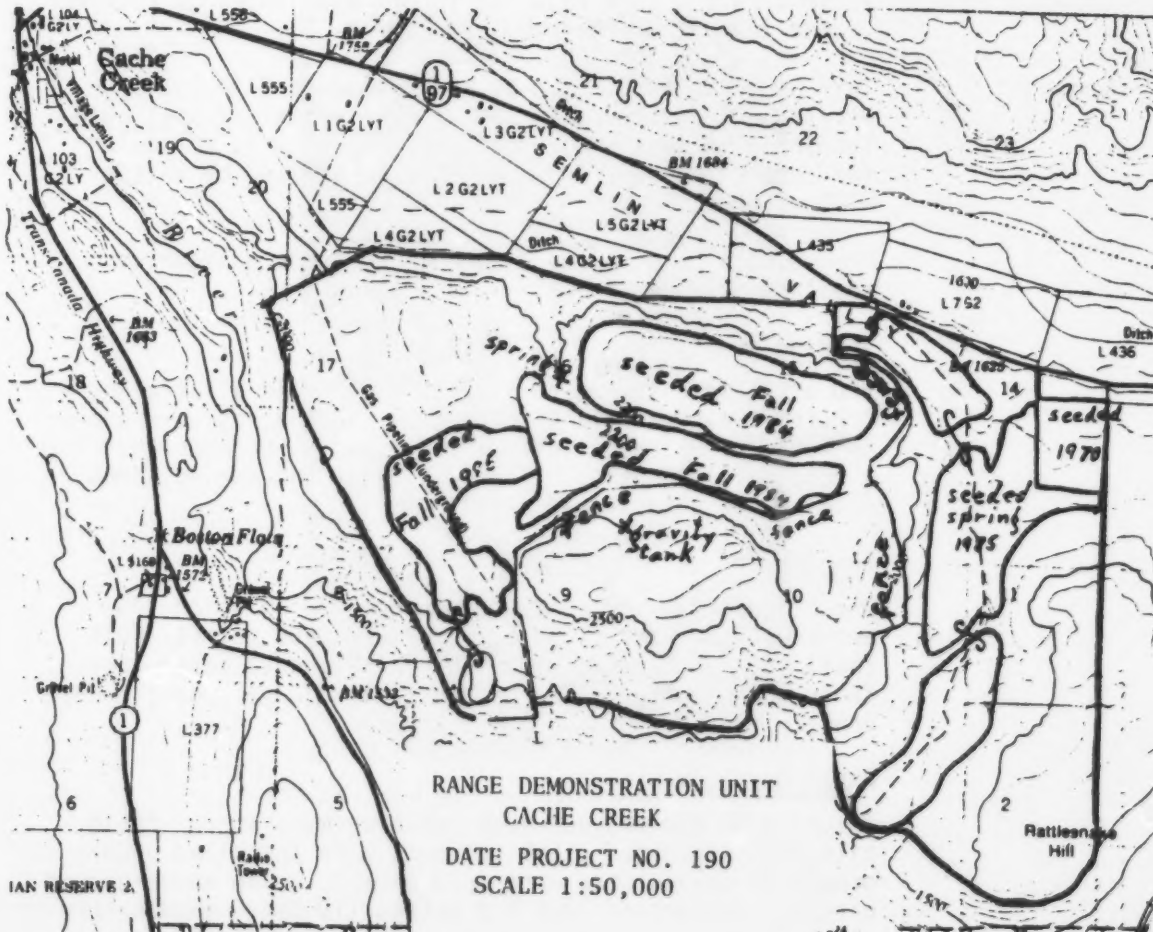
Summary: The following objectives were met by the mission:

1. Mission members became aware of the scope and magnitude of China's agricultural sector and its agri-food technological requirements.
2. Through symposium participation, mission members were able to present the agri-food technology and expertise which British Columbia can offer to meet China's modernization objectives. This was accomplished by presenting videotapes and publications on agricultural technology at the Ministry's booth and by personal contact with Chinese officials, buyers and farm operators.
3. Formal business relations were established permitting discussions on specific projects and allowing for the preparation of proposals on a host of business opportunities with China. The mission learned more about China's agricultural development priorities, and specific trade

and co-operative opportunities were identified and discussed.

4. The goal of establishing specific working relationships with several Chinese agencies was realized which means that future negotiations between entrepreneurs from this province and the Chinese can proceed without further introductions or negotiations at the diplomatic level.
5. To assist in trade development, mission members met with legal and financial institutions including the Canadian Chamber of Commerce in Hong Kong. Specific business opportunities were pursued with regard at the diplomatic level.
6. The mission was able to pursue and support market development opportunities in Japan relative to B.C.'s breeding stock, frozen dairy semen and dairy embryo transplants. Opportunities were also sought for pure-bred swine breeding stock, fresh and processed pork products and other agricultural and processed food. A concurrent federally-approved tree-fruit mission to Japan involving two mission members (Marshall and Hodge) encouraged Japanese authorities to relax restraints on apple imports and facilitate the entry of B.C. MacIntosh and Spartan apples to that market.
7. There were many opportunities for mission members to encourage Chinese, Hong Kong and Japanese food exporters and buyers to participate in B.C.'s international food show, FOOD PACIFIC '86, in 1986.

RANGE DEMONSTRATION UNIT - CACHE CREEK



Project Number: 190

Supervision: A. Bawtree, Provincial Range Specialist, Kamloops;
L. Brown, Engineering Technologist, Kamloops

Co-operators: J. Schalles, Rancher, Ashcroft; J. White, Range Branch,
Ministry of Forests, Kamloops

Branches: Field and Special Crops, Engineering, Regional Extension
Services, Thompson-Cariboo

Funding: D.A.T.E. 1985-86 \$34,550
J. Schalles
Ministry of Forests, Kamloops District

- Objectives:
1. To demonstrate economic improvement and management of range.
 2. To secure a land base for future applied range research and demonstration purposes.

Summary: This project was started by the cooperators in 1984. Development continued in 1985 to the extent of available funding. Initial development of the range is scheduled for completion in 1986 at which time grazing by cattle will commence.

Progress to date may be divided into three categories: seeding, fencing and water development.

Seeding -

530 acres were seeded to a mixture of Grimm alfalfa and crested wheatgrass in October 1984. 410 acres were seeded in April, 1985 and a further 160 acres in October 1985 for a total of 1100 acres. The fall, 1984 and spring, 1985 seeding has established satisfactorily.

Fencing -

One major cross fence has been completed of which 1787 metres (5863 feet) is barbed wire and 2108 metres (6916 feet) is high tensile smooth wire. A second major cross fence approximately 4420 metres (14520 feet) long is under construction.

Water Development -

A spring on the project area has been excavated. Drain tile and corrugated steel culverts were installed underground to collect the water and pipe it to an above-ground circular collection tank 5.8 metres (19 feet) in diameter and 2.74 metres (9 feet) high. 1341 metres (4400 feet) of buried pipeline has been installed through which water will be lifted by a diesel-powered pump to a second tank of the same size. From the second tank the water will flow by gravity through buried pipelines to stock-watering troughs at strategic locations throughout the project area. Tanks and gravity distribution lines are presently being installed.

Several tours of the area were conducted in 1985 including tours by the B.C. Range Committee and the Plant Science Lead Committee.

NOSEMA DISEASE CONTROL IN HONEYBEES



D. McCutcheon and M. Wyborn collecting bees
for Nosema disease examination

Project Number: 191

Supervision: D. McCutcheon, Supervisor of Apiculture Program,
Abbotsford

Co-operators: R. Clapham, Aldergrove

Branches: Field & Special Crops, Apiculture Program

Funding: D.A.T.E. 1985-86 \$2,600

Objectives: To determine if applying fumagillin in dry bakers fondant
sugar is an effective means of controlling Nosema apis
in honeybees. (Nosema apis causes dysentery in adult bees).

Summary:

The method under study proved equally as effective in controlling nosema as is the normally recommended method in which fumagillin is applied in sugar syrup.

Thirty hives were divided randomly into three groups. Group one was used as a control and fed sugar syrup only. Group two was a second control in which fumagillin was fed in the sugar syrup. Group three was the test group in which fumagillin was fed mixed with dry sugar. The amount of sugar fed in each group was equal.

Sugar and fumagillin were applied twice. Bees were collected from hives at 5 intervals in order to conduct Nosema spore counts.

The results will be applicable in situations where spring sugar syrup feeding is not required.

Further tests will be needed to determine a) the minimum amount of dry bakers fondant sugar which will provide required results; b) if the method is applicable in fall feedings; c) if the method is applicable in queen mating nucleus hives.

IDENTIFYING MAJOR FACTORS THAT AFFECT SILAGE QUALITY



Inspection of first growth forage.

Project Number: 192

Supervision: Peter Jones, District Agriculturist, Courtenay;
Grant Henry, Acting District Agriculturist, Courtenay

Co-operators: Beaver Meadow Farms Ltd., Anderton Road, Comox

Funding: D.A.T.E. 1985-86 \$18,000

Objectives:

1. To determine management guidelines for the production of high quality grass silage (20% Crude Protein, 70% Total Digestible Nutrients).
2. To correlate intensive management and its economic feasibility on a producer basis.

Summary: The project covered a 5 month silage production period on Beaver Meadow Farm. Detailed records were made of cutting intervals and field operations in relation to dry matter yield quality, and cost production. Two similar 20 acre fields of 45% Orchard Grass, 45% Perennial Rye Grass, and 10% legume, were studied. Quality as measured by crude protein (C.P.) and total digestible nutrients (T.D.N.) was found to be inversely related to dry matter yield.

Three regrowth periods were examined to give a range of qualities and yield in aftermath regrowth; a short regrowth period of 25 days gave highest quality, but at an increased cost per ton of dry matter produced. The production cost per ton of crude protein and total digestible nutrients is significantly lower for high quality immature forage.

The results of the demonstration trial indicate that equivalent yields of dry matter are obtainable by more frequent harvesting, six cuts as opposed to four. The advantage in additional harvesting is a much greater yield per hectare of C.P. and T.D.N.; on average 3% greater protein, 4-5% greater T.D.N. per hectare. The increased capture of C.P. and T.D.N. offset the additional costs of multiple field operations.

The major benefit of producing high quality silage is found in reduced reliance on costly dairy ration concentrate. Home grown high quality silage can result in significant savings in annual feed expense.

In economic terms, high quality silage will cost approximately \$10/ton more than low quality silage. The projected savings of concentrate therefore must cover this increase in production costs. Research has indicated that medium to poor quality silage requires a daily concentrate supplement of 2Kg dry matter per cow to give the same milk yield as high quality silage. At current B.C. market prices, an average B.C. producer (100 cow herd) could reduce their concentrate feed bill by \$200/day.

1986 research will examine actual animal response to high quality silage in an extensive feeding trial to be carried out at Beaver Meadow Farm.

DETERMINATION OF FORAGE QUALITY WITH CHANGING GROWTH STAGES

Project Number: 193

Supervision: Garth Elgie, District Agriculturist, Prince George

Co-operators: Lyle Rode, Ruminant Nutritionist, Agriculture Canada;
Ken Watson, beef grower; Harold Geisbrecht, dairy farmer;
Francis Zingle, beef grower.

Branches: Regional Extension Services, Central/Peace Region;
Field Crops Branch, Central/Peace Region

Funding: D.A.T.E. 1985-87 \$29,200

Objectives:

1. To establish the quality and yield of forages at weekly intervals during the growing season and to correlate this information over time.
2. To develop a guideline to be used by producers whereby optimum harvesting periods for quality and yield can be realized and thus assist in making harvesting decisions.
3. To demonstrate the importance of plant growth stages in determining the optimum harvesting conditions, stressing quality, to producers.

Summary: Background -

Dr. R. McQueen, Agriculture Canada, Fredericton, initiated a hay forecast (quality and yield changes on a weekly basis) in Atlantic Canada. A model has been developed from this data to predict optimum cutting time for hay based on forage species and environmental factors. It would be desirable to have a similar model for Central B.C.

The project was begun in May, 1985 and will continue until the summer of 1987. Six forage mixes and 10 varieties of legumes and grass are clipped weekly. Clippings are measured for yields and chemically analyzed in the Agriculture Canada laboratory. Second cuts will be taken at the weekly intervals that generate significant regrowth.

Results are released to the media within five days of clipping. The farming community has the information in a very short time to assist in making harvesting decisions on their forage crops. The plots are cut for approximately 10 weeks during the growing season.

TECHNOLOGY STUDY TRIP TO ENHANCE B.C. BERRY CROP PRODUCTION



Examining the B.C. raspberry variety Chilcotin in
the rain at the research plots at the Norwegian
Agricultural University, Aas, Norway

Project Number: 195

Supervision: W.S. Peters, P.Ag., Provincial Berry Specialist,
Abbotsford

Co-operators: Agriculture Canada, Export Expansion Fund and Dr. Hugh
Daubeny, Agriculture Canada Research Station, Vancouver

Branches: South Coastal Regional Extension Services

Funding: D.A.T.E. 1985-86 \$425.00
(Plus \$2,320 from Agriculture Canada, Export Expansion
Fund).

Objectives: To attend the IV Annual International Rubus & Ribies Symposium in Norway, Sweden, Denmark and Scotland to study their raspberry and black currant industries with a view to increasing the export of Certified B.C. Raspberry plants; to make professional contacts, and to obtain information that could help the continued expansion of the local raspberry and black currant industries.

Summary: There were 63 delegates representing 18 countries at the Symposium. In addition to the scientific meetings, there were visits to Agricultural University and Research Station plots plus commercial growers in all countries.

There is interest in purchasing Chilcotin and Skeena raspberry plants, plus future variety releases, from the B.C. Certified Plant Program. Consequently, future exports of planting stock are anticipated at the expense of Washington State propagators who were found to have exported mixed varieties to one commercial Danish grower.

The widespread virus disease situation in the Scottish industry can only strengthen one's resolve to have a high quality planting stock scheme as a basis for the expanding B.C. raspberry industry.

Information gained on modern black currant cultural and harvesting systems plus the detection of Reversion Virus are expected to help ensure the firm establishment of a small, but viable, black currant industry in the Province. Consequently, B.C. should change from a total importer to a net exporter of black currants before the end of the decade.

MICRO CLIMATE AND NUTRITIONAL REQUIREMENTS OF COMMERCIAL GINSENG PRODUCTION

Project Number: 196

Supervision: Al Oliver, Horticulturist, Kamloops

Co-operators: Dr. Bailey, Simon Fraser University; John Latta, Chia-Na-Ta Ginseng Products Co.; Dr. Bill Van Lierop, B.C.F.A.F.

Branches: R.E.S. Kamloops-Cariboo Region
Soils, Okanagan-Kootenay

Funding: D.A.T.E. 1985-86 \$5,460
D.A.T.E. 1986-87 \$6,279

Objectives: To determine the cultural strategies for the production of Ginseng in B.C. with specific reference to micro-climate control, nutritional requirements and disease and insect problems.

Summary: During the first year of this programme, much data and information was gathered. At the date of this writing it has not been correlated, so no definite statistics are available. The following observations have been made:

1. The crop seems to be quite sensitive to a zinc deficiency.
2. Any direct sunlight causes severe burning of the leaves, thus proper shade is mandatory.
3. The crop is sensitive to spray injury if not applied in correct dosages or the right timing, e.g. when extremely hot.
4. The crop is a host to dodder, a parasitic weed which is a problem, particularly on alfalfa.
5. It is not a high nutrient requirement crop, especially with respect to nitrogen.
6. The percent dry matter seems to be high (compared to other information available) when grown in this climate, which is a positive feature.
7. Seed production has not been high, possibly due to heat stress at the site in Lytton.
8. In the dry Lytton climate, only one application of mulch at only half the depth is required for the four year production cycle. This compares to 2 applications at twice the volume in Eastern Canada.

Eighty six tissue samples and 15 soil samples were taken and analyzed for macro and micro nutrients at the B.C.M.A.F. Laboratory in Kelowna. The resultant data will provide a good comparison for next years study.

There was virtually no insect or disease damage on any of the fields (1, 2 or 3 year old) with the exception of a slight root rot problem in some of the wet areas.

The high quality work done by the co-operators has provided ideal conditions under which to carry out this study. A cultural requirement fact-sheet will be produced in the fall and winter of 1986-87. At this time, Ginseng production appears to be a viable cash crop for at least the interior of B.C., although startup costs are very high.

ONION DISEASES IN THE SOUTH COASTAL REGION



Onion White Rot Control Plots
Cloverdale - 1985

Project Number: 197

Supervision: D.J. Ormrod, Plant Pathologist, Cloverdale

Co-operators: J.M. Rutherford, Project Employee; H.S. Snow, Regional Extension; B.C. Coast Vegetable Co-operative; Eric Littley, Simon Fraser University; Cloverdale Produce Farm; Fred Wong; Arie Van Halst.

Branches: Crop Protection; Regional Extension Services, South Coastal Region

D.A.T.E. PROGRAM REPORT 1985

Funding: D.A.T.E. 1985-86 \$3,000
B.C. Coast Veg. Co-op 1985-86 \$3,500

Objectives: To survey bulb onion crops in the Cloverdale area to determine the changes, if any, in the distribution and severity of diseases since the last survey was conducted in 1976; to evaluate methods of control for white rot, downy mildew, and blast.

Summary: A total of 179 acres of bulb onions on the 10 largest onion farms in the Cloverdale area were surveyed twice for disease incidence. Each grower was given a detailed report showing the incidence of the eight major diseases in each of the fields surveyed. Changes since 1976 were not marked and consisted of wider distribution of pink root and a much lower incidence of downy mildew, the latter due to the long, dry summer of 1985.

Neither blast nor downy mildew occurred in the fungicide trials conducted in green or bulb onions so no data was collected on efficacy although crop samples were collected for residue analysis.

In the white rot control plot, spring soil fumigation appeared to be impractical for muck soil. Results of fungicide drenches were inconclusive due to inadequate levels of disease. In the cultivar trials, Eskimo and Norstar showed promise of resistance compared to Taurus and Gladiator.

The fungicide drench and cultivar trials will be repeated in 1986.

CAUSE AND CONTROL OF PARSNIP CANKER



Comparison of Canker Infected Parsnip Root
and Healthy Root - Yarrow, B.C., 1985

Project Number: 198

Supervision: Mark Sweeney, Processing Vegetable Specialist,
Abbotsford; Dave Ormrod, Plant Pathologist, Cloverdale

Co-operators: Iris Bitterlich, Project contractor; Dr. R. Copeman,
Plant Pathologist, U.B.C.; Bruce Wisbey, parsnip
grower

Branches: Regional Extension Services, South Coastal Region;
Crop Protection Branch

D.A.T.E. PROGRAM REPORT 1985

Funding: D.A.T.E. 1985-86 \$3,500

Objectives: To determine the cause of parsnip canker and related disorders and to determine if high rates of lime, various fungicide treatments and/or resistant varieties can provide control.

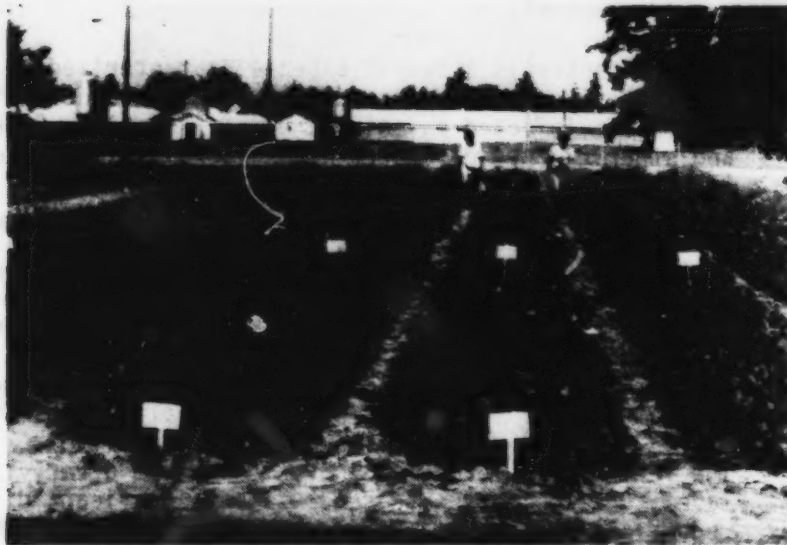
Summary: Parsnip canker is a fungal disease characterized by dark, sunken lesions which form mostly on the shoulders of the tap root. Infected parsnips are unmarketable. Canker and other related disorders are major limiting factors to the expansion of B.C. parsnip production.

Parsnips were seeded in May, 1985 in a field with a history of canker. Treatments consisted of a preplant application of 7 tonnes/hectare of ground limestone and the fungicides Bravo, Benlate, Manzate, Difolatan and fixed copper applied at two week intervals through August and September. Also, ten varieties were seeded to evaluate for resistance and commercial suitability.

The very dry summer of 1985 kept canker at a very low level. Preliminary data suggests no significant disease reduction from any of the treatments. Several of the new varieties show promise in terms of yield and quality, but no differences were detected in degree of disease infection. More data will be gathered in the spring after the canker has been allowed to build to higher levels. Further evaluations will be carried out in 1986, hopefully under greater disease pressure.

Diseased parsnip samples are currently being analyzed to gain a better understanding of the roles of the various fungi involved in canker formation.

FUMIGATION OF COLE CROP SEEDBEDS



Fumigation with Vorlex (bed left centre) provided excellent weed control compared with the control (bed right centre)

- Project Number:** 199
- Supervision:** M. Sweeney, Processing Vegetable Specialist, Abbotsford;
D.J. Ormrod, Plant Pathologist, Cloverdale
- Co-operators:** Iris Bitterlich, project contractor; Dr. H.S. Pepin,
Plant Pathologist, Agriculture Canada, Vancouver Research
Station
- Branches:** Regional Extension Services, South Coastal Region;
Crop Protection Branch
- Funding:** D.A.T.E. 1985-86 \$3,900
- Objectives:** To evaluate several materials and methods of cole crop
(broccoli, cauliflower, and brussels sprouts) seedbed
fumigation for control of clubroot, seedling weeds and
other diseases.

Summary:

The disease, clubroot, is responsible for heavy losses each year for Fraser Valley cole crop growers. It continues to spread to new fields often through the use of infected transplants.

Seedbed fumigation is one method of ensuring clubroot-free plants and, as a side-benefit, achieving weed control and freedom from other diseases. Growers, however, have been slow to adopt the standard methyl bromide fumigation due to the high cost and cumbersome and hazardous application procedure. Several relatively inexpensive, easy to apply materials were evaluated in this project.

Treatments were applied on April 15, 1985 to a clubroot infested sandy loam soil. Basamid, a granular, was broadcast at 400 kg/ha, rotovated in to a depth of 20 cm and sealed by rolling and sprinkling with .5 cm of water. Vorlex was applied at 340 L/ha and 450 L/ha with a hand injector at 30 cm intervals, 15 cm deep and sealed by rolling. Vapam was applied at 340 L/ha and 500 L/ha as a dilute drench (simulating a sprinkler irrigation injection application) in 1.5 cm of water. Immediately after application, half of each plot was covered with a clear polyethylene tarp. Tarps were removed two weeks after application and plots aerated. Cauliflower was seeded on June 4, 1985.

All treatments reduced clubroot infection compared to the control, but no treatment gave the complete control necessary in a seedbed. Tarping improved clubroot control in the Vapam plot.

Seedling weed control was very good for all chemicals where a plastic tarp was used. Bare plots of Basamid and Vorlex provided acceptable control, but weed control on the bare Vapam plot was less satisfactory - especially at the lower rate. There were no detectable differences between treatments in damping off or other diseases, but dry conditions kept disease levels low.

Higher rates of these materials and alternate application procedures will be evaluated in 1986 to determine if more complete clubroot control can be achieved.

INTENSIVE APPLE PLANTING DEMONSTRATION PROJECT

Project Number: 200

Supervision: M. Sanders, Provincial Tree Fruit Specialist, Kelowna;
Dr. H. Quamme, Pomologist, Agriculture Canada, Summerland;
D. Holder, B.C. Fruit Packer Co-operative, Kelowna

Co-operators: Mr. Rod King, Orchardist, Penticton

Branches: Regional Extension Service,
Okanagan-Kootenay Region

Funding: D.A.T.E. 1985-86 \$7,962
New Crop Development Fund 1985-86 \$15,000
Mr. Rod King 1985-86 \$7,962

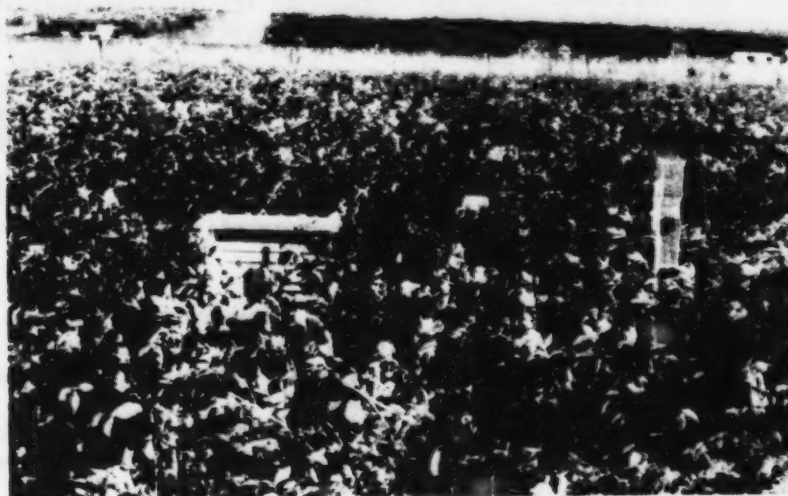
Objectives: To demonstrate four apple training systems in a commercial orchard with McIntosh, a commercial cultivar, and Jonagold, a promising new cultivar. The systems chosen are U.S.D.A. Central Leader, Van Rouchoudt Trellis, Central Axe, and Slender Spindle. Rootstocks to be used in this planting are M 9 and M 26.

An economic analysis will be prepared annually by George Geldart, B.C.M.A.F., showing total costs and returns for each combination under trial.

Summary: Due to the availability of trees on the appropriate rootstocks, this plot will not be planted until spring 1987. Land preparation has commenced, posts and wires have been purchased, and deposits for trees have been made.

Note: The D.A.T.E. Committee has recently been advised that the Co-operator may not proceed with this project.

DEVELOPMENT AND IMPLEMENTATION OF POTATO
INTEGRATED PEST MANAGEMENT



Temperature and rainfall measuring equipment
in place on a potato field for late blight prediction

Project Number: 201

Supervision: A.J. Buonassisi, Plant Pathologist, Cloverdale

Co-operators: B. Vernon, Entomologist, Agriculture Canada, Vancouver;
B. Cahill, Project Employee

Branches: Crop Protection

Funding: D.A.T.E. 1985-86 \$6,500

Objectives: To promote the commercial adaptation of potato integrated
pest management (IPM) in the Fraser Valley through the
demonstration of disease (late blight) and insect (tuber
flea beetle and aphids) monitoring.

Summary:

A two year D.A.T.E. project was initiated in June, 1985 to promote the commercial adaptation of potato integrated pest management (IPM) by demonstrating current potato disease and insect monitoring techniques. Potato IPM involves monitoring weather and insect populations to determine the exact timing and frequency of pesticide applications. The advantages of IPM include improved pest control, reduced losses to the grower and a reduction in pesticide application.

Late blight, a major fungal disease of potato, was monitored by establishing five weather stations, one in Richmond, one in Delta and three in Cloverdale. Weekly collection of temperature, relative humidity and precipitation data provided the basis of blight prediction and spray recommendations.

In the hot dry summer of 1985, many growers applied frequent sprinkler irrigations which resulted in the creation of blight favorable conditions. As a result, blight warnings were given and spray recommendations made in mid to late July. This further demonstrated the effectiveness of the late blight prediction system although it did not reduce the number of sprays applied as it has in the past.

Tuber flea beetle monitoring was the other component of potato IPM under demonstration to growers. Cooperating grower's fields were routinely checked using a sweep net sampling method to determine the numbers of insects as a basis for spray recommendations. The integration of disease and insect monitoring techniques was successfully demonstrated to growers who were supportive of the program. In 1986 this program will continue with emphasis on improved monitoring efficiency, increasing grower acceptance and awareness and reducing pesticide application and costs.

FRANCOIS LAKE PASTURE PROJECT

Project Number: 202

Supervision: Al McNeil, Livestock Specialist, Prince George

Co-operators: Gordon McFee, Francois Lake
Bob Fowler, B.C. Ministry of Forests, Burns Lake
Ken Long, B.C. Ministry of Forests, Houston
Jim Tingle, Field & Special Crops Branch, B.C.M.A.F.,
Prince George
Graeme Johnstone & Jill Watt, R.E.S.,
Central/Peace River Region

Branches: Livestock

Funding: D.A.T.E. 1985-86 \$3,700

Objectives:

1. To demonstrate pasture management techniques and electric smooth wire fencing.
2. To evaluate alternative pasture forages to extend the local grazing season.
3. To evaluate a rotational grazing system on tame pastures in relation to native ranges.

Summary: Most summer forage is now obtained from native range vegetation. The costs of using traditional ranges are increasing, especially where travel is involved to reach them. In addition, recent work has shown that forage production and feed quality of native blue grass-aspen ranges drop sharply after July 30. As forage values decrease, weight gains for both cows and yearling cattle decrease. It is felt that tame pastures can be intensively managed to maintain feed quality longer through the grazing season as well as reduce costs associated with native range. Careful selection of forage varieties and species plus the use of management aids such as electric fencing are tools available to reduce these costs.

This project involved splitting an old hay field into four paddocks using a three-wire electric fence. The cattle are to be rotated through the paddocks to maintain forage in a vegetative state. The 20 hectare field was fertilized with 36-0-11 at 45 kgs. N/acre. Fencing and water development construction started about June 1 and was completed near the end of the month.

The summer was very dry with virtually no rainfall over the entire growing season. These drought conditions heavily impacted on the project. Cattle were placed in the rotation as soon as the fence was finished but there was no regrowth and they had to be removed before the end of July. Due to the dry conditions, forage species intended for testing to lengthen the grazing season could not be planted.

The electric fence proved very effective in controlling cattle, even in very dry conditions. The top and bottom wire were charged, while the middle wire was grounded at the end of each section. The charge was not great if only the top or bottom wire were touched. However, if the middle wire was also touched a substantial shock was received. Once cattle became aware of the fence they respected it even when the power was off.

Even though the drought limited the results for this year, the project is in place for the next two years and more information will be collected. Perennial and annual forage mixtures will be planted next spring.

RENOVATION OF KNAWEED INFESTED RANGELAND



Renovating Knapweed Infested Rangeland - Pritchard, B.C.

Project Number: 203

Supervision: R.S. Cranston, Provincial Weed Specialist, Kamloops

Co-operators: F. Hart, Thompson-Nicola Regional District;
B.C. Hydro and Power Authority; P. Edwards, Rancher

Branches: Field and Special Crops Branch

Funding: D.A.T.E. 1985-86 \$1,000
Cooperators 1985-86 \$4,665

Objectives: To determine and demonstrate the most cost effective
long term method for renovation of heavily knapweed
infested rangeland. .

Summary:

Project work commenced with picloram herbicide application in May 1985 and seeding with a crested wheatgrass/orchardgrass mix in October 1985. Knapweed control to date is excellent. Two hectares of currently unsprayed seeding will be sprayed in 1986 when the grass mix develops. A field day was held in October, 1985 to show the B.C. Ministry of Agriculture and Food range seeding equipment in operation and to view results of spring herbicide application. This project encompasses and will compare the following weed management systems: native untreated range; spring herbicide application followed by fall seeding; fall seeding followed by spring/summer herbicide application; native infested range sprayed only; and native infested range seeded only.

Plots will be established in 1986 to show the relative merits of fertilizing each of the above project components. A videotape is being made of all phases of the project from initiation to treatment results.

B.C. MINISTRY OF AGRICULTURE AND FOOD (B.C.M.A.F.)
D.A.T.E. PROGRAM REPORT 1985

WILD (FERAL) HOG CONTROL

Project Number: 204

Supervision: R.J. Charles, District Agriculturist, Abbotsford

Co-operators: B.C. Ministry of Environment; B.C. Ministry of Lands,
Parks and Housing

Branches: Regional Extension Services, South Coastal Region

Funding: D.A.T.E. 1985-86 \$999.00

Objectives: To demonstrate the removal of dangerous, free roaming,
European wild pigs from Crown Lands in the upper Fraser
Valley through a baiting and trapping program.

Summary: The project was initiated in July, 1985. The B.C. Federation
of Agriculture was hired as a contractor reporting to B.C.
Ministry of Environment (Fish and Wildlife Management). The
Federation contracted with Mr. Jack Lay to locate and remove
the wild pigs. Funding to a maximum of \$3,000 to be provided
by the three co-operating ministries.

As of early January, 1986, ten pigs had been destroyed as
a result of the baiting and trapping program and an additional
twenty-five or so had been disposed of by hunters. Fish and
Wildlife personnel will continue to respond to sightings
and will evaluate the control program during the spring of
1986.

IMPROVING B.C. FRESH STRAWBERRY MARKET SHARE



Strawberry Test Plots, Abbotsford

Project Number: 205

Supervision: W.S. Peters, Provincial Berry Specialist, Abbotsford

Co-operators: Tom Bauman, Fraser Valley Strawberry Growers Association;
Dr. Hugh Daubeny, Agriculture Canada, Research Station,
Vancouver; Bob Hornidge, Horticulture Technician,
Abbotsford

Branches: Regional Extension Service, South Coastal Region

Funding: D.A.T.E. 1985-86 \$5,000

Objectives: To determine if any of the available June-bearing (the standard type) or day neutral (everbearing) varieties of strawberries grown in other areas of North America have an improved fresh market potential over those varieties presently being grown commercially in British Columbia. If superior fresh market varieties could be identified, it would lead to increased local production of strawberries and decreased imports.

D.A.T.E. PROGRAM REPORT 1985

Summary: This project started in May, 1985 and will not be completed until December, 1986. As the work is presently under way, only a progress report is given.

Sixteen June bearers and seven day neutral varieties were planted out through a black plastic mulch into raised beds of fumigated soil at the Agriculture and Food Centre, Abbotsford. Due to shipping delays, six varieties from the Ontario breeding program died, but all others established well.

Harvesting of the day neutrals began July 29 and continued until the first killing frost, October 6, 1985. Tristar and Tribute (U.S.D.A., Maryland) were the heaviest yielders. Tristar was especially flavorful while both produced large, attractive fruit. Saxuma and Burlington (Washington) produced intermediate sized crops of large berries, but they were softer and of poor flavor. Tillikum, Quinalt (W.S.U., Washington) and Selva (California) produced fruit that was unacceptable on at least two accounts.

In 1986 the winter hardiness and virus susceptibility will be monitored as will the productivity and quality of all varieties.